SOUTHERN POWER AND INDUSTRY

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AUGUST, 1953

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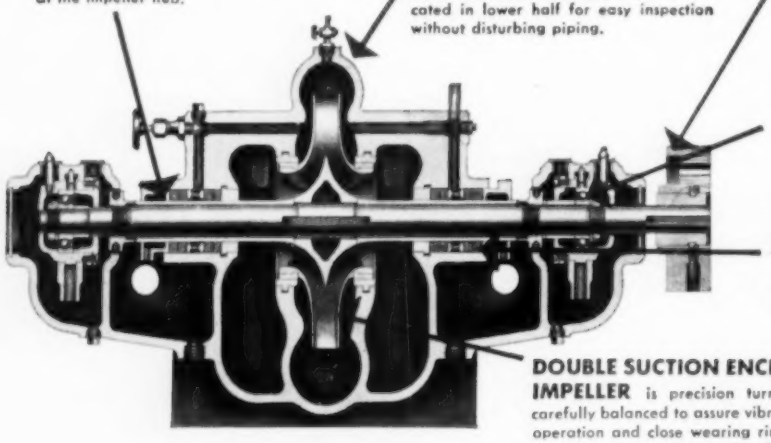
Look for These 7 Signs of GOOD PUMP DESIGN

CAST SHAFT SLEEVES, not commercial tubing, save the shaft from wear. Sleeves extend through the stuffing box and seal at the impeller hub.

HEAVY HORIZONTAL SPLIT CAST-IRON CASING construction with suction and discharge nozzles located in lower half for easy inspection without disturbing piping.

COUPLINGS have *Magic-Grip* quick change bushings for pump and drive shaft. Pin and rubber bushing type usually used. Removal for maintenance is easy.



BALL BEARINGS may be furnished for either oil or grease lubrication. Sleeve bearings also available in larger sizes.

GENEROUS STUFFING BOX LENGTH contains sufficient packing to keep stuffing box maintenance low. Provision is made for sealing water connections or for grease seal if these are required.

DOUBLE SUCTION ENCLOSED IMPELLER is precision turned and carefully balanced to assure vibrationless operation and close wearing ring clearance. Water passages are hand finished to a smooth surface.

STANDARD AND SPECIAL MATERIALS are available for many types of service where government regulations permit. Iron, bronze, stainless steel and combinations of these materials handle both alkaline and acid solutions. Standard sizes carried in stock range from 10 to 7000 gpm with heads as high as 475 feet.

THESE DESIGN AND CONSTRUCTION features of Allis-Chalmers double suction pumps assure long pump life and low maintenance costs. Every A-C double suction pump is carefully tested on the most modern pump testing equipment in the industry.

Complete Pumping Unit

Allis-Chalmers can furnish the complete pumping unit — pump, motor, control and drive — all of coordinated design and manufacture.

Whatever your pumping problem, call your nearby Allis-Chalmers Authorized Distributor or District Office. Or write for Bulletin 08B6146. Allis-Chalmers, Milwaukee 1, Wisconsin.

A-3952

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MOTORS — ½ to 25,000 hp and up. All types.

CONTROL — Manual, magnetic and combination starters; push button stations and components for complete control systems.

TEXROPE V-belts in all sizes and sections, standard and *Vari-Pitch* sheaves, speed changers.

ALLIS-CHALMERS

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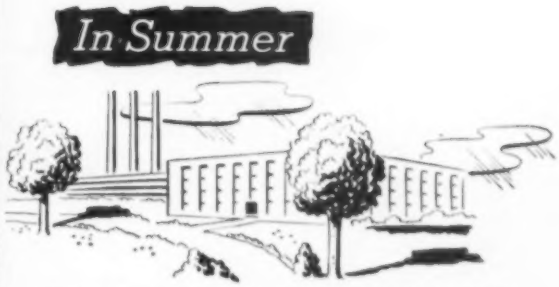
Volume 71 Number 8

CLARAGE *Multitherm*
AIR CONDITIONING UNITS

THEY HEAT AND HUMIDIFY



THEY COOL AND DEHUMIDIFY

. . . . *year-'round comfort at low cost*

Clarage Multitherm Conditioning Units are double duty machines. They keep your place cool and dehumidified in summer. They heat and humidify in the wintertime.

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Multitherm Units come in vertical and horizontal types as shown—ten sizes—capacities 600 to 20,500 c.f.m. You use a direct expansion refrigerant, cold water or brine for cooling; steam or hot water for heating.

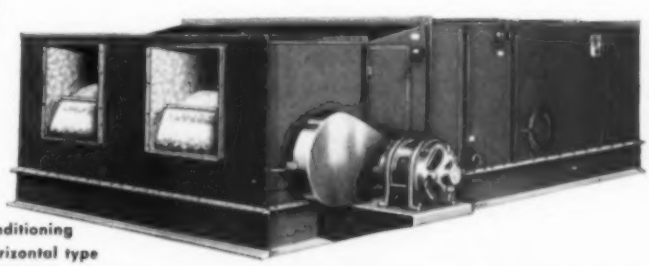
Multitherm Conditioning Unit—vertical type

. . . . *or process conditioning*

Aside from comfort applications in offices, plants, stores, etc., Multitherm Units are widely used in industry where production depends upon a certain temperature and humidity. Clarage Capillary Conditioners are available for cases where extremely close control is needed to meet requirements.

We welcome your inquiry for any desired information.

CLARAGE FAN COMPANY
Kalamazoo, Mich.



Capillary Conditioning Unit—horizontal type

You can Rely on . . .

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FOR ALL TURBINES

SOUTHERN POWER AND INDUSTRY

Vol. 71 No. 8

AUGUST 1953

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Facts and Trends

FOR SOUTHERN INDUSTRIAL AND POWER EXECUTIVES

August, 1953

► STEAM AND POWER EXPANSION at Shell Oil Company's Houston Refinery is summarized in this issue of SP&I by C. A. Schaeffer of the refinery's utilities department. Miniature indicators and control units and demineralization by ion exchange are engineering features of the company's No. 2 steam generating plant.

Bailey boiler controls, pressure indicators and steam flow meters are in a central, air conditioned control room. Recording instruments are mounted on a vertical panel; Bailey Mini-Line indicating and control instruments on a sectionalized console located in front of the recorder panel. The miniature indicators and control units make it practical to concentrate all information and controls for efficient unit operation into a small space before a single operator.

Boiler plant is operated on 100% treated makeup. Permutit 695,000 lb/hr capacity deaerating feedwater heater is the spray type with scrubber section and internal vent condenser. Deionizing water treating plant (96,000 gph) consists of 8 ion exchangers arranged in two banks of four each. Regeneration of an ion exchanger is a semi-automatic process, controlled by a motor operated multiport valve.

► TANK CLEANING TECHNIQUE eliminates scaffolding and handling of heavy materials. Thickened inhibited jel acid is applied to the tank surfaces by using high-pressure jets. Acid clings to walls while chemical action is taking place.

After setting 6 to 8 hours it is flushed off with a neutralizer and detergent solution to remove any oil film and minimize residual product odors. Total time for cleaning job is usually 24 to 36 hours. The Dowell development is used for cleaning the inside, outside and tops of tanks.

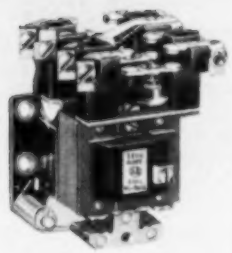
► FREE PISTON ENGINE COMBINED WITH GAS TURBINE--Cooper-Bessemer, reporting in this issue on development work, believe their design will provide the most practical heavy duty gas turbine. The free piston engine-turbine requires less space than needed by other prime movers, can be installed at much lower cost per horsepower, and costs less to maintain and supervise.

High operating efficiency is one of the greatest advantages over conventional gas turbines--efficiencies as high as 40% are reported for the Cooper-Bessemer unit, compared to commercial attainment in the 25% range for conventional gas turbines. Feature of the new unit is the method used to supply the turbine with heat energy.

In conventional gas turbine, air for combustion is compressed by a rotary type blower. Blower or compressor is driven from the shaft of the gas turbine itself. After air is compressed, fuel is burned

(Continued on page 6)

HUM-FREE A-C RELAYS



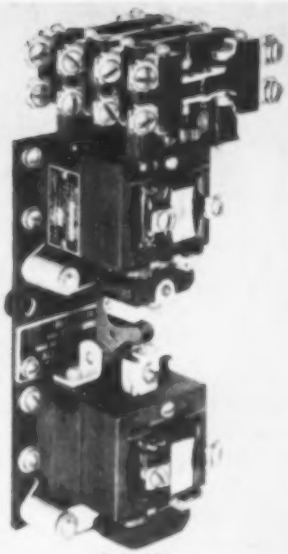
TYPE BM
RESIDUAL MAGNETIC LATCH

Here are two unique, hum-free relays that require no coil current to keep them closed.

The Type BM relay is a compact unit which is closed by momentarily energizing the solenoid coil. The relay is held firmly closed by residual magnetism until opened by a momentary demagnetizing current.

The Type BXL relay is a standard Bulletin 700 magnetic relay with a mechanical latch. The secondary solenoid, beneath the relay, delatches the upper relay to open it.

Allen-Bradley Co.
1328 S. Second St., Milwaukee 4, Wis.



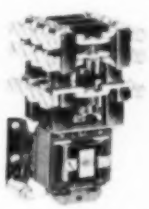
TYPE BXL
MECHANICAL LATCH

A-C and D-C TROUBLE FREE CONTACTORS and RELAYS

for Automatic and Sequence Controls

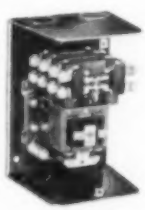
4 Pole A-C Relay

This universal type relay is equipped with four normally open contacts and four normally closed contacts, all actuated by one solenoid plunger. Great flexibility of circuit connections is offered by the double arrangement of contacts. Will handle circuits up to 600 volts a.c. Widely used in refrigeration and air conditioning. Contacts need no maintenance.



8 Pole A-C Relay

Bulletin 700 relays are listed in many contact combinations and polar arrangements. They are widely used for oil burners, stokers, unit heaters, and as control relays for electric furnaces. They are good for millions of trouble free operations. Their consistent performance makes them ideal for machine tool sequence operations. There is no contact maintenance.



Relay in Enclosure

These relays can be furnished open or in enclosures that protect them in applications where watertight, weatherproof, or explosion-proof enclosures are needed.

Push buttons and limit switches available in a variety of enclosures.

Send for Allen-Bradley Bulletin 700 for details of relays with 1, 2, 3, 4, 5, 6, 8, and 10 poles.

3-Wire Thermostat Relay

Low Current A-C Relay

For temperature controls with thermostats.

D-C Relay

2 N.C. —1 N.O. contacts.

A-C Contactor

Allen-Bradley a-c contactors are available up to 900 amperes.

D-C Contactor

Allen-Bradley direct current contactors are available in single and double pole construction up to 600 amperes.

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in a pressure combustion chamber between the compressor and the tank.

In the new unit, the free piston engine replaces both the rotary compressor and the low pressure combustors supplying hot gas under pressure to the gas turbine. The free piston engine furnishes its own high pressure efficient combustion chamber with the engine's power cylinder.

► A GLASS-LINED SMOKE STACK is the latest steel-ceramic union. A. O. Smith Corporation's 85 ft power house stack is protected inside and out with glass coatings, approximately five one-thousandths of an inch in thickness. Bonding of these coatings took place at 1600 F.

Sections of glass-coated steel hung in active smoke stacks for periods ranging up to a year of testing have shown no corrosive deterioration. This first glass-lined stack will constitute a "guinea pig" to be kept under observation for the next several years. If satisfactory, the company expects to find in the process a new commercial adaptation of its glass-fused-to-steel techniques.

► THE ACETYLENE PROCESSES are vital tools in industrial plant maintenance. At Republic Steel Corporation's Gadsden, Alabama, integrated steel mill, nearly 300 men handle oxy-acetylene equipment for maintenance purposes alone.

The welding department has 48 employees while the rigger, machine, electrical, locomotive and car, pipe and boiler shops and the foundry each have a number of men who burn, heat treat, gouge, weld, heat, or melt with the oxy-acetylene flame. Millwrights and motor inspectors under the joint supervision of the maintenance superintendent and their own superintendent, make up the balance.

Although spectacular,unusual and difficult welding and cutting jobs are probably the most interesting and challenging, it is the day to day routine work--reclaiming material, hard surfacing and rebuilding production equipment--which the acetylene processes perform that pay the biggest dividends in maintenance work.

► DURING THE NEXT TEN YEARS, more than 3,000 new multi-million dollar manufacturing plants will be built in the South and Southwest, predicts H. McKinley Conway, director of the Southern Association of Science and Industry.

Two years ago, SASI reported that the South was adding an average of one new multi-million dollar manufacturing plant for each working day. A similar rate of progress was reported for last year. On this basis, Mr. Conway estimates, perhaps very conservatively, that in the next ten years, the South will add more than 3,000 new factories.

Continued expansion of manufacturing activity will bring the South up to the national average in per capita income, according to the prediction, reverse the flow of college graduates from the region, and virtually eliminate the old tenant farming system. Over 10,000 professional scientists will be added and it will be necessary to build 200 major plants to produce new products not yet discovered.

Write the editors for additional information on any of the above items. SOUTHERN POWER & INDUSTRY. 806 Peachtree St., N.E. Atlanta 5, Ga.

ALL FORGED STEEL

Edward UNIVALVES

Lower Pressure Drop 25-50% with Straight-Thru Flow

As shown photographically here, the streamlined internal contours and the inclined stem construction of the Edward Univalve give straight through flow — which careful laboratory tests have shown to result in pressure drop 25 to 50% lower for Univalves than other globe valve types. Turbulence, too, is greatly lowered by these streamlined contours. And lowering turbulence lengthens valve life by eliminating vibration, the principal cause of wear in small globe valves.

But lower-pressure drop and less turbulence are not the only reasons the Univalve has become an industry standard for tough high pressure, high temperature services. Here are just a few of the benefits which add up to longer life and lower maintenance for this outstanding all Forged Steel Valve.

LONGER PACKING LIFE **through a positive backseat and deep cooling chamber which protects packing in service. Isolation of packing prevents blow-out when repacking under pressure.**

PERFECT ALIGNMENT, EASY DISASSEMBLY **when necessary, through foolproof patented body-bonnet connection.**

EXTRA WEARING SEATING SURFACES— **seat formed by application of continuous ring of Stellite to valve body; Stellite hard-facing applied to alloy steel disk.**

EASY PACKING ADJUSTMENT **with through bolted, accurately guided gland.**

EFFORTLESS SEATING **with Impactor handwheel in sizes 1¼ in. and larger.**

DESIGNED FOR HIGH-PRESSURE, HIGH-TEMPERATURE APPLICATIONS
Two different classes rated for 1500 lb sp at 1023F or 2500 lb sp at 1033F.

AVAILABLE IN A WIDE RANGE OF SIZES
Furnished in 1500 lb or 2500 lb pressure classes in sizes from ½ in. to 2 in.

CHECK VALVES, TOO
Check type Univalves, of spring loaded piston design, have the same basic construction as globe Univalves. Use them together for all welded construction for small pipe lines, eliminating all bonnet joint leakage problems.

IDEAL FOR BLOW-OFF SERVICES
Univalves meet all ASME code requirements for blow-off service and are adaptable for high pressure installations to 3120 psi boiler pressure.

Get the full story on Univalves, ideal all-purpose steel valves—write for Catalog 12G1.

Rod through Univalve demonstrates straight thru flow of this valve.

Edward Valves, Inc.
Subsidiary of ROCKWELL MANUFACTURING COMPANY
122 West 144th Street EAST CHICAGO, INDIANA

Another Product

Equipment . . Supplies . . Methods

for the plant engineer and operating force

Tank Cleaning Method

H-1 DOWELL INCORPORATED, Box 536, Tulsa, Okla., has introduced a tank cleaning method which applies a thickened inhibited jel acid to the tank surfaces by using high-pressure jets.

The acid clings to the walls while the chemical action is taking place. After setting 6 to 8 hours it is flushed off with a neutralizer and detergent solution to remove any oil film and minimize residual product odors. Total time for this cleaning job is usually 24 to 36 hours, depending on the tank size.

This tank cleaning service is designed to remove rust and corrosion products prior to applying protective coatings; and to remove all traces of former deposits prior to changing product storage. This method reduces the possibility of contaminating new products stored in old tanks. It is used to clean the inside, outside and tops of tanks.

Free additional information is available to readers of SP&I. Circle the item code number on one of the reader service post cards provided on pages 17-18.

Demagnetizer Unit

H-3 THE MARTINDALE ELECTRIC Co., 1334 Hird Ave., Cleveland 7, Ohio, has developed a new demagnetizer as an aid to better production through the removal of loose metal filings, chips, etc., from the edges of cutting tools.

This Model D-3 can be used for a wide variety of work, large and small. To demagnetize small items, such as cutting tools, the item is drawn slowly back and forth across the poles and then slowly drawn away. For larger parts, or in cases where it is not convenient to move the part, the Model

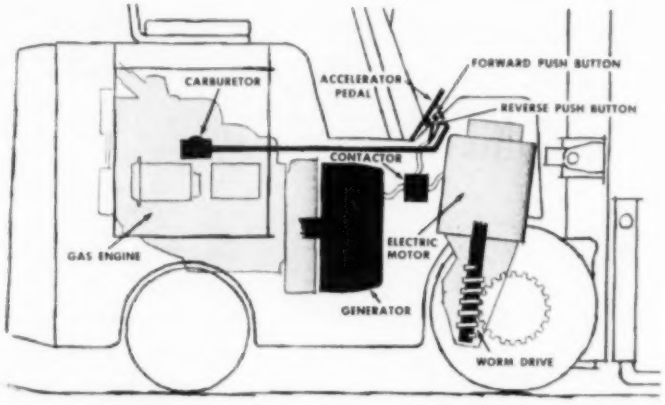
D-3 can be held upside down by its convenient handles and passed over the part until its entire surface has been exposed. Switch and pilot light are at one end, next to handle.

No Clutch; No Gear Shift In Fork Lift Truck Design

H-2 THE BAKER-RAULANG COMPANY, Baker Industrial Truck Div., 1230 W. 80th St., Cleveland 2, Ohio, has announced the development of a radically new fork lift truck which is said to provide unprecedented fuel economy, smoothness of acceleration, ease of maintenance, safety and operator convenience.

Called the "Gas-O-Matic," the new truck achieves many of these operating advantages through a transmission system that needs no clutch nor gear shift. It uses a gasoline engine, a specially-designed variable voltage generator and an electric motor as its power system.

Key element in the system is the variable voltage generator, which is an integral assembly with the engine connected to the drive shaft. As engine rpm increases, voltage output of the generator builds up, following a smooth unbroken curve pattern.



A Hercules gasoline engine is directly coupled to Baker's exclusive variable voltage generator, which is in turn connected through electric wiring to a drive motor on the drive axle. Energy developed in the engine is sent to the generator, which acts as a "booster" for the drive motor.

Artist's conception of Baker-Raulang's Gas-O-Matic power system. Transmission system needs no clutch nor gear shift. Travel speed and direction is controlled entirely by foot control. Key element in system is variable voltage regulator—as engine rpm increases, voltage output of generator builds up.

(*Continued on page* 10)

For Nitric Acid Storage . . .

A HORTON Stainless Steel Tank

35-ft. diam. by 35-ft. stainless steel Horton tank installed for the corrosion-resistant storage of nitric acid at a Louisiana petro-chemical plant.

Commercial Solvents Corporation uses a stainless steel tank to store 60 per cent nitric acid at its Sterlington, La., plant. The 35-ft. diam. by 35-ft. structure is made entirely of stainless steel except for a carbon steel angle around the top of the shell.

During the field erection of this structure a Chicago Bridge & Iron Company Welding Supervisor was assigned to the job to inspect and test welds, check welding equipment and supervise the cutting and grading of test plugs. It was his job to see that all requirements set forth in the specifications were met. Field supervisory service of this type is standard practice on all Chicago Bridge & Iron Company structures, *without cost to you.*

Write our nearest office for quotations on tanks made of carbon steel or corrosion-resistant metals. There is no obligation on your part.

CHICAGO BRIDGE & IRON COMPANY

Atlanta 3.....2180 Healey Bldg.
Birmingham 1.....1531 North Fiftieth St.
Boston 10.....1044—201 Devonshire St.
Chicago 4.....2107 McCormick Bldg.
Cleveland 15.....2218 Midland Bldg.
Detroit 26.....1534 Lafayette Bldg.
Havana.....402 Abreu Bldg.
Houston 2.....2132 C & I Life Bldg.
Los Angeles 17...1545 General Petroleum Bldg.
New York 6.....3312—165 Broadway Bldg.
Philadelphia 3....1646—1700 Walnut St. Bldg.
Pittsburgh 19.....3252 Alcoa Bldg.
San Francisco 4.....1531—200 Bush St.
Seattle 1.....1345 Henry Bldg.
Tulsa 3.....1628 Hunt Bldg.

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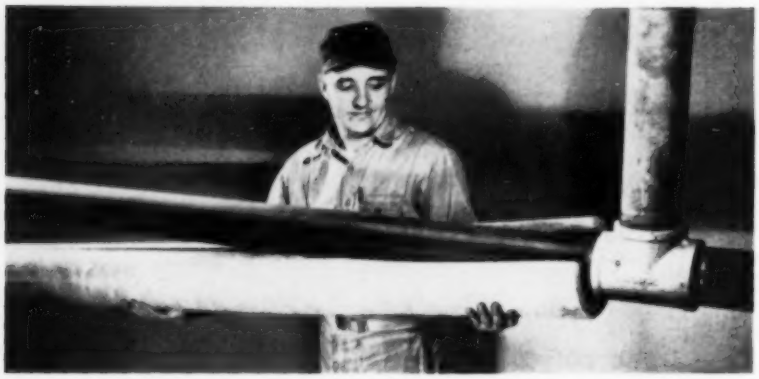
Equipment . . Supplies . . Methods (Starts on Page 8)



Glass Fiber Pipe Insulation

H-4 GUSTIN-BACON MANUFACTURING CO., 210 W. 10th St., Kansas City, Mo., announces a new one-piece molded fine glass fiber pipe insulation, known as G-B Ultrafine Pipe Insulation.

Unusual features of the new product are: exceptional thermal efficiency; light weight (claimed to be 4 to 10 times lighter than any other on the market); flexibility; resilience; non-breakable; insoluble in water; cuts readily—no special tools needed; clean to handle; can be painted; available in one-piece 6 ft lengths for faster application.

Gustin-Bacon's Ultrafine pipe insulation, composed of glass fibers bonded with a phenolic resin and molded into one piece sections, will not rot, mold, decay or absorb moisture. It is suited for all heated piping applications up to 350 F, or a "second layer" of insulation in high temperature applications and for low temperature applications of all types.

Track Transfer Bridge Speeds Material Flow

H-5 ROTARY LIFT COMPANY, 1099 Kentucky, Memphis, Tenn., has developed an Oildraulic Transfer Bridge which raises to provide a "shortcut" bridge across railroad spur tracks, and lowers to become an integral part of the track system for train operation at industrial plants.

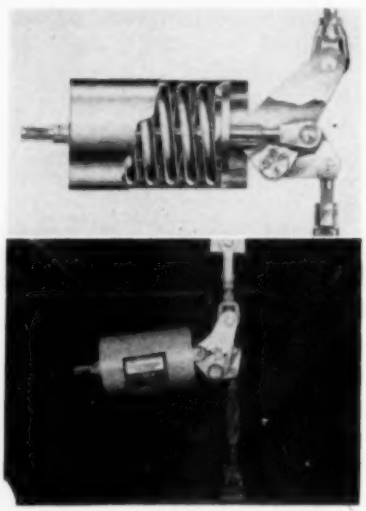
In addition to recessed rail-type (illustrated) Rotary Lift Company has developed the rotating-type for use between double tracks (fits between tracks when not in use) and the drawbridge-type for short spans (where there is sufficient overhead clearance).

This hydraulically operated bridge forms a roadway over which traffic, including power trucks, can move on a straight line.

Pipe Hanger Design

H-6 NATIONAL VALVE & MANUFACTURING COMPANY, 3117 Liberty Ave., Pittsburgh 1, Pa., has developed the NAVCO Counterpoise Pipe Hanger for high temperature piping systems.

The device is a spring-actuated counterbalance which, through a system of linkage, transforms the varying force of the spring in an accurate mathematical ratio to produce a load supporting effort of constant value throughout the entire range of travel as the pipe expands or contracts because of temperature changes.



Here's how the flexible top connection permits the National Valve Counterpoise pipe hanger assembly to fall in line with the direction of the load pull, so that horizontal travel of the piping has no appreciable effect on hanger operation. Unit may be positioned at any angle, affording flexibility in installations where close clearances are a factor.

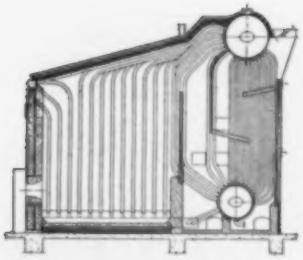
The pipe hanger is available in 16 different frame sizes with load capacity ranging from 200 to 16,000 pounds and expansion travels up to 12 in.

Automatic Firing in Heavy Duty Steam Cleaner

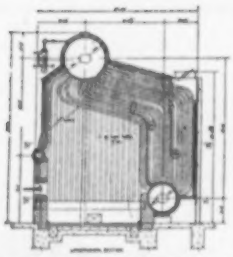
H-7 KELITE PRODUCTS, INC., 1250 N. Main St., Los Angeles 12, Calif., has introduced a newly designed high volume steam cleaner featuring automatic firing.

Turning on two electric control switches places the machine in operation. One controls a specially designed automotive piston-type pump, while the second ignites the non-clogging automatic oil burner. The burner uses

(*Continued on page* 109)



2 Drum Water Tube Boiler



Type-S 2 Drum Boiler Series S1

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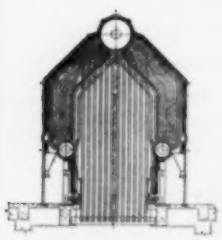
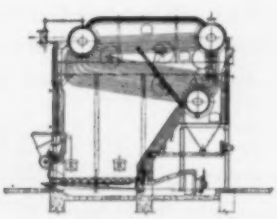
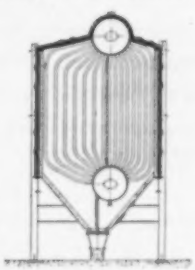
• In the oil, paper and chemical industries and in manufacturing plants, institutions and public buildings throughout the world Wickes Steam Generators are in constant daily service. All types, such as those illustrated on this page, with capacities up to 250,000 lbs. steam per hour and 1000 psi. Write for descriptive literature.



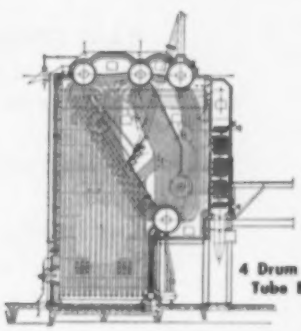
"A" Type Water Tube Boiler



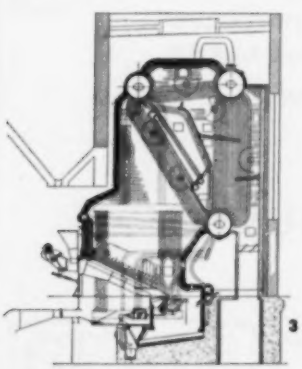
3 Drum Low Head Water Tube Boiler



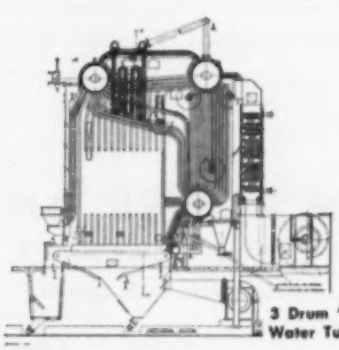
Wickes 2 Drum Waste Heat Installation



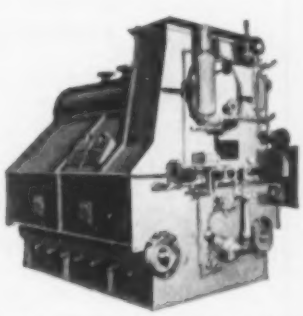
4 Drum Water Tube Boiler



3 Drum Water Tube Boiler



3 Drum "B" Type Water Tube Boiler



Type "A" "Packaged" Steam Generator

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Lighting & Other Facilities
Instruments & Controls
Production Equipment
Manpower Utilization
Other Functions of Broad Interest

CASE STUDIES will show exactly how production has been improved in specific Southern and Southwestern Plants. While emphasis will be placed on increased production, related improvements such as equipment modernization, better maintenance, fewer rejects, reduced operating costs, etc., will be included as part of the overall **BETTER PRODUCTION THEME.**

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Variable Raw Water Turbidity

UP TO 2000 PPM

Portion of installation of Graver Reactivator, 23 ft dia. x 13 ft high, at Plant Yates of Georgia Power Co. View from operating platform.

Consistent Clarified Water Turbidity

BELOW 10 PPM

at Plant Yates

GEORGIA POWER CO.

The turbidity of the Chattahoochee River at Plant Yates varies widely and is frequently as high as 2000 ppm. Also, the pH sometimes varies rapidly between 6 and 8.

But this combined clarification and stabilization problem presents no difficulties to the Graver Reactivator, which produces 400 gpm of clear water with a turbidity consistently below 10 ppm and with pH automatically controlled within specified limits through all the variations in the raw water supply.

Graver Reactivators are assuring similarly complete and dependable clarification for boiler feed, municipal water supply and industrial plants all over the country. Write for full information; and if you have a water conditioning problem of *any* kind, be sure to get Graver recommendations. Graver manufactures equipment for *every* water conditioning problem. Our modern designs are based on more than 40 years of specialized experience.

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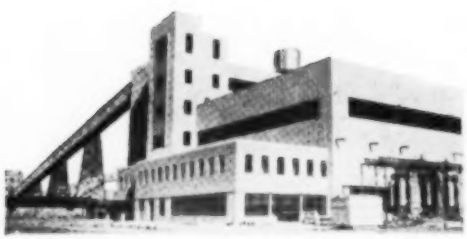

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"Early this year I had the opportunity to lay out a wiring job for the Nehi Bottling Works at Boise, Idaho.

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FUSETRON dual-element FUSES do more than protect against short-circuits —they give 10 POINT PROTECTION

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"The heating in the switch stopped immediately and we have not had that type of trouble since."

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516 **OIL AND GREASE SEALS**—Catalog No. 10, 100 pages—Describes and illustrates types of Klosure oil and gas seals for bearings, with typical applications and complete list of sizes and types—also a mechanical pressure seal for rotary shafts—THE GARLOCK PACKING COMPANY.

525 **HEAVY DUTY VACUUM CLEANING**—Survey—To show the advantages of increased productivity, better quality control, reduced fire and health hazards which are possible through the use of U. S. Hoffman Machinery heavy duty vacuum cleaning equipment.—U. S. HOFFMAN MACHINERY CORP.

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565 **CONTROLLED LUBRICATION** — Service Handbook, 56 pages—Describes the Lubriplate film and how its application arrest progressive wear, protects machinery, cuts down costs, and serves diversified applications in industrial, utility and service plants.—LUBRIPLATE DIVISION, FISKE BROS. REFINING CO.

ENGINES, DRIVES POWER TRANSMISSION MATERIALS HANDLING

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611 **BELT CONVEYORS**—Catalog ID-481A—Describes Continental belt conveyors featuring standard and special idlers and many convenient accessories for application in materials handling.—CONTINENTAL GIN CO.

615 **VARIABLE SPEED TRANSMISSION** — Form 700, 32 pages — Describes variable speed pulleys, "Selecto Speed Transmissions," V-belt transmissions with representative applications, engineering data, etc.—LOVEJOY FLEXIBLE COUPLING CO.

618 **WOVEN WIRE SLINGS** — Illustrated handbook shows construction details of gripper woven wire slings, with views showing how such slings are used for both production work and general materials handling. — THE CAMBRIDGE WIRE CLOTH CO.

624 **GEAR MOTORS**—Booklet 1815, 16 pages—Double and triple reduction units with integrally mounted electric motors, in standard sizes of 1 to 30 horsepower, with output speed of 300 down to 6 rpm.—LINK-BELT CO.

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Equipment and Review Editor
SOUTHERN POWER AND INDUSTRY
806 Peachtree St., N. E.
Atlanta 5, Ga.

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WATER TREATMENT, HEATING VENTILATING, AIR CONDITIONING REFRIGERATION, DUST & FUME CONTROL

729 **INDUSTRIAL WATER AND WASTE TREATMENT** — Bulletin 50-I—A comprehensive manual for all responsible or interested in the selection of water conditioning, sewage and waste treatment equipment in industry and commerce. —INFILCO INCORPORATED.

740 **ION EXCHANGERS**—Bulletin 3501—Describes Cation and Anion exchangers—states their application and explains the necessary equipment for application to industrial processing.—THE PERMUTIT CO.

755 **BOILER WATER CONDITIONING** —Catalog, 12 pages—Outlines difficulties caused by industrial water contamination, and recommends water conditioning treatment for scale, sludge, corrosion, carryover and other boiler troubles. Details on the Drew System of complete boiler water conditioning are fully explained.—E. F. DREW & CO., INC.

758 **REFRIGERANT PURGERS**—Bulletin 221, 4 pages—Describes a forged steel purger for venting air and other noncondensible gases from refrigerating systems. Discusses the air problem, explains how the purger operates, and gives engineering data and installation photographs. ARMSTRONG MACHINE WORKS.

766 **HIGH CAPACITY WATER SOFTENERS** — Bulletin 301 describes high capacity Beloclite softeners for lowest operating costs and increased efficiency. Includes chemical conversion tables and tables on tank capacity, with information regarding Beloc automatic controls.—BELCO INDUSTRIAL EQUIPMENT DIVISION.

ELECTRICAL

807 **ELECTRONICS COMMUNICATION SYSTEM**—Catalog—Describes a high and low level voice plant communication system—public address, operational intercommunication, amplified party-line telephone, all provided in one complete system. —GAI-TRONICS CORPORATION.

825 **POWER CAPACITORS** — Manual 50-B—Describes power factor improvements and the problems involved, with helpful data and installation on the use of Sprague capacitors for on-the-spot power factor correction at minimum cost. New impregnant permits units 33⅓% smaller.—SPRAGUE ELECTRIC CO.

828 **ELECTRIC TRANSFORMERS** — Bulletins TU-13 and TU-56—Describe the design and construction features that make Wagner liquid filled and dry type unit sub-station transformers outstanding—can be connected to any make of switchgear.—WAGNER ELECTRIC CORPORATION.

833 **BRONZE BEARINGS FOR MOTORS** — Catalog 152 — Gives complete specifications of stock bronze bearings particularly intended for application to electric motors.—THE BUNTING BRASS & BRONZE CO.

840 **MOTOR ACCESSORIES, CONTROLS**—Catalog, 76 pages, gives complete information regarding switches, starters, contactors, speed regulators, and various accessories for electric motors, complete with illustrations, condensed general data, dimensions, prices, etc.—ALLEN-BRADLEY CO.

861 **FUSETRON FUSES** — Booklet — Gives complete facts on Fusetron dual-element fuses, a combination fuse and thermal cut-out of low electrical resistance and high time lag—prevents shut-downs, saves maintenance costs.—BUSSMANN MFG. CO.

MISCELLANEOUS . . . SAFETY, BUILDING EQUIPMENT, METALS

907 **SHEET METAL PANELS, CUBICLES, ETC.**—Descriptive Booklet—"Contract Manufacturing in Sheet Metals" describes job-tailored control centers, bus enclosures, cubicles, switchgear housings, panel and various other sheet metal assemblies for utility and industrial plant applications.—THE KIRK & BLUM MFG. CO.

921 **VACUUM CLEANING**—Form A-700, 16 page booklet, describes the greater plant cleanliness, safety and productivity gained through the use of Hoffman heavy duty vacuum cleaning. Applications and installations illustrated.—U. S. HOFFMAN MACHINERY CORP.

957 **ROTARY DUMPERS FOR MINE AND RAILROAD CARS**—Booklet 2048-A — Describes and illustrates rotary railroad car dumpers, capable of unloading open-type railroad cars at the rate of 1½ min to a full cycle of dumping and return.—LINK-BELT CO.

960 **UNIT HEATERS**—Thermoiler Catalog—Describes the important features of Thermoiler unit heating, an economical method of adequate plant heating. —GRINNELL CO., INC.

969 **INSULATING BRICK** — Brochure IN-115A — Describes the construction, application and use of insulating firebrick, including insulating brick, hydraulic-setting refractories, aggregates and fills—for service temperatures up to 2000°F.—JOHNS-MANVILLE CORP.

994 **MULTICLONE MECHANICAL DUST COLLECTORS**—Booklet M-204—Describes, with illustrations and diagrams, the basic principles of dust recovery by mechanical means at maximum efficiency.—WESTERN PRECIPITATION CORP.

Continued on page 118

8-53-2

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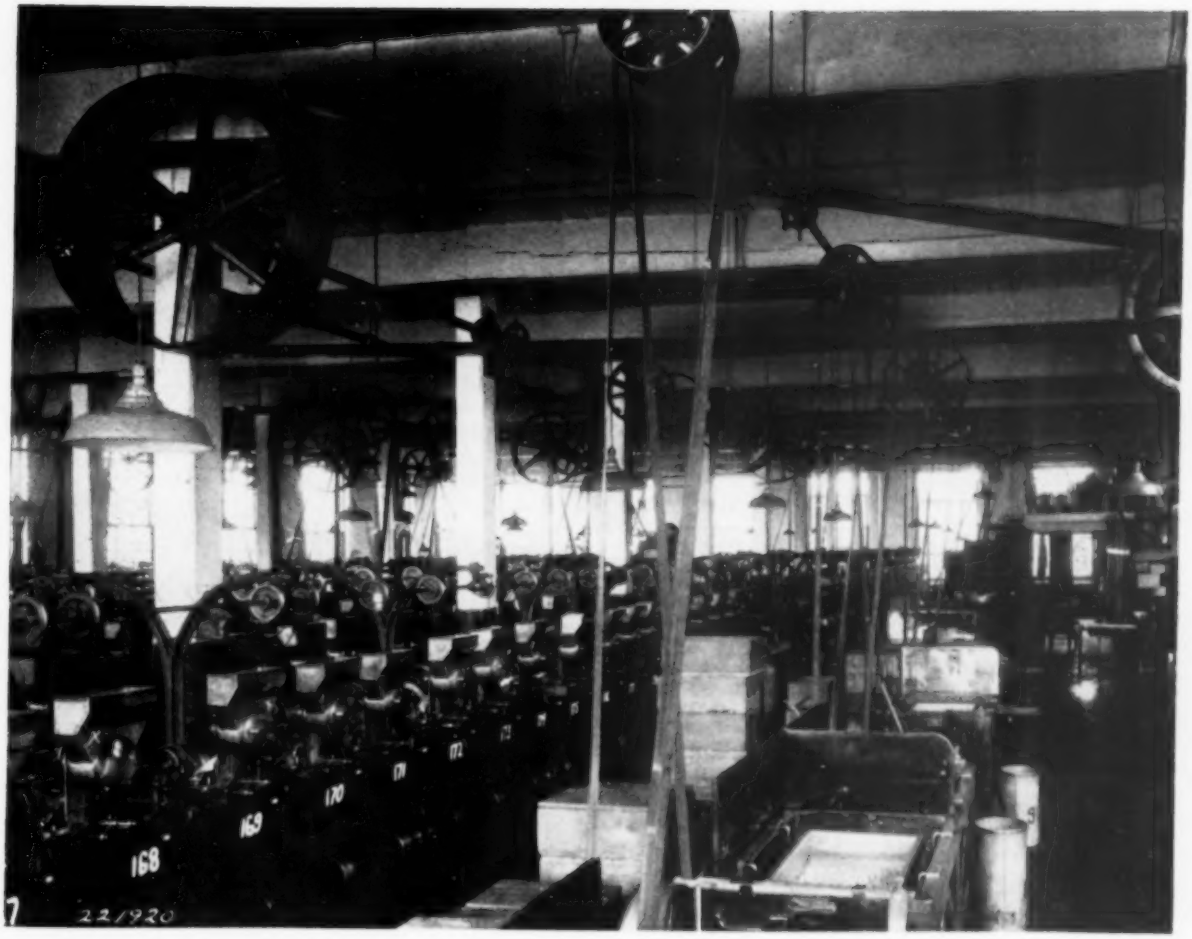
List Items You Want, Tear Out and Mail One of the Attached Cards Now!

Please be sure to fill in your Firm's Name and your position on the Coupon. This service cannot be extended to you unless this information is furnished.



A Cut Above The Average

THE *right* cutting oil for the job gives cutting tools longer life, reduces rejects; produces cleaner cuts and finer finishes. Throughout the South, producers of machine tools and precision instruments have learned from experience that they can depend on Standard Oil Cutting Oils to help them secure improved finish, closer tolerances; and to cushion against shock and protect tools from wear in cutting, drilling, reaming and tapping. Because of their great cooling effect, they make high speeds possible. There is a Standard Oil lubrication engineer in your area. His accumulated experience on lubrication in your field will be helpful. His services cost you nothing—they may save you much.

Standard Oil Company
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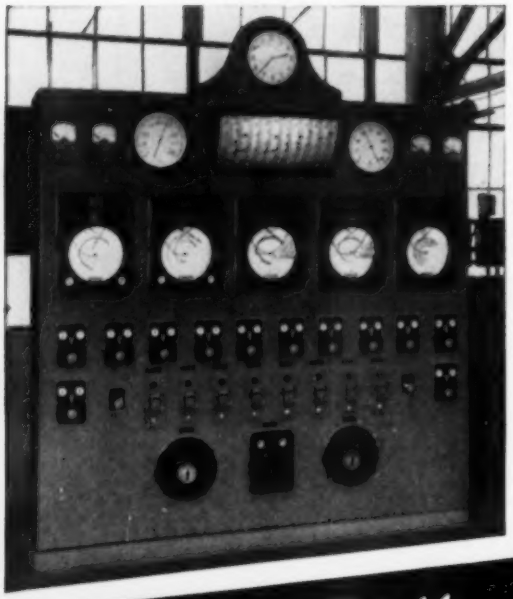

This Bailey Boiler Control Panel in a mid-western industrial plant saves fuel and insures safe operation of a 100,000 lb per hr, 175 psi, sat., pulverized coal and gas-fired boiler.

What's Your Control-Dollar Efficiency?

Control-dollars frequently bring annual investment returns of 100% or more. When you buy adequate, well-applied steam plant controls, you increase your dollars' ability to work usefully for you.

That's where Bailey can help: Bailey Controls can give you a better control-dollar efficiency. Here's why:

1. **Complete Range of Equipment—fully co-ordinated.** You need never worry that a Bailey Engineer's recommendation is slanted in favor of a particular type of equipment, just because he has a limited line to sell—or that Bailey will pass the buck for efficient control; we offer *complete* boiler control systems.

2. **Engineering Service—backed by experience.** No other manufacturer of instruments and controls can offer as broad an experience, based on successful installations involving all types of combustion, flow measurement and automatic control.

3. **Direct Sales-Service — conveniently located near you.** Bailey Meter Company's sales-service engineers are located in more industrial centers than those of any other manufacturer of boiler control systems; you get prompt, experienced service with a minimum of travel time and expense.

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For better control-dollar efficiency—for more power per fuel dollar, less outage and safer working conditions, you owe it to yourself to investigate Bailey Controls. Ask a Bailey Engineer to arrange a visit to a nearby Bailey installation. We're proud to stand on our record: "More power to you!"

A-112-1

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HALL INDUSTRIAL WATER REPORT

Hall Laboratories, Inc.—A Subsidiary of Hagan Corporation, Pittsburgh, Pa.

Volume 1 | AUGUST 1953 | Number 4

Coal Washer Maintenance Costs Cut in Half

Maintenance costs on the coal washer for a big steel plant were running as high as $18,000 a month when Bill O'Brien, Hall field engineer, was consulted. The main trouble in the washing process arises when iron pyrites in the coal come in contact with air and water. Sulphuric acid is formed, and plays hob with the equipment. Drawing on his experience with similar situations, Bill prescribed treatment of the wash water with Banox* corrosion inhibitor. Maintenance has already been cut in half, unscheduled shutdowns have been eliminated, and further improvement can be anticipated.

Water is your industry's most important raw material. Don't waste it.

Epsom Salt Sales Boom in West

Hall-man Hankison of Denver reveals what associate W. C. Bennett did to keep a client happy.

A new 1500 psig boiler filled with raw water required fast silica reduction. No magnesium compounds were available at the plant for the purpose, so Bennett went to a drugstore and asked the clerk for five pounds of Epsom Salts. The clerk looked startled, the order was repeated, and the sale made.

Only five pounds wasn't enough. So the next evening he returned to the drugstore for an additional five pounds.

This was too much for the clerk, who braced himself firmly, looked Bennett squarely in the eye, and said explosively, "What FOR?"

Lamme Medal Awarded Dr. Hall

The Benjamin G. Lamme medal, one of Ohio State's top honors, was awarded to Dr. Ralph E. Hall at the spring quarter commencement exercises. Dr. Hall received the award for meritorious achievement in engineering.

Said the Ohio State Lantern in announcing the award, "Not only is Dr. Hall credited with the development of water conditioning into an exact science based on sound scientific principles, but his contributions to the entire power industry are considered invaluable. Today the Hall system of boiler water treatment is practically standard throughout the world."

From its founding in 1926, until his retirement in 1950, Dr. Hall was director of Hall Laboratories. He still serves as a consultant to Hall Laboratories on both research and development problems in their work as water consultants to industry.

Dr. Hall is the author of 64 papers, and some 54 patents have been issued on Hall processes. He is a member of the American Chemical Society, the American Society of Mechanical Engineers and two national honorary societies, Phi Beta Kappa and Sigma Xi.

Report Shows Scope of Hall Service

The following extracts from a recent report of Basil Welder, Hall Service Engineer, demonstrates what is meant by "Hall Plant-Wide Water Service." The Hall Service Engineer is not only informed on industrial water but is also alert to the many factors of operation and layout which affect results.

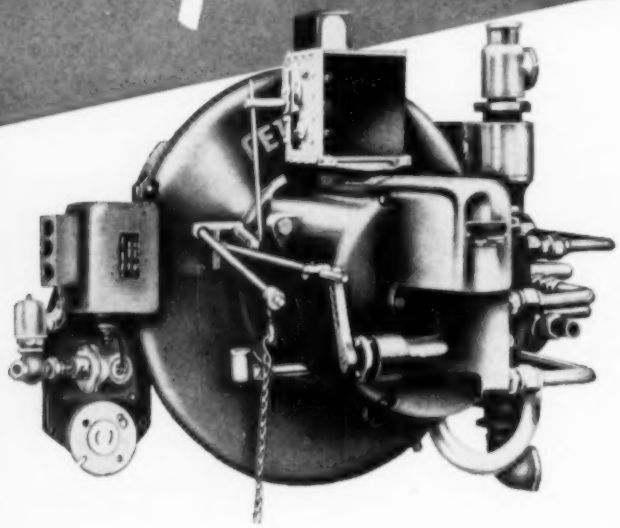
- Persuaded steel plant to make mechanical changes in open-hearth door frames to improve cooling.
- Located leak of clay slip into condensate return system of ceramic plant.
- Introduced Hagafilm* for control of corrosion in condensate return system of glass plant.
- Established system for treating water in five air-conditioning systems in large department store.
- Recommended special filter to plant manufacturing compressed gases, reducing oil in condensate to insignificant level.
- Used Burosil* in boilers of synthetic-fuels laboratory to get rid of sludge through precipitation of magnesium.
- Prepared survey of alternative systems of primary treatment of feedwater for new boilers of steel plant.

Industrial Water Problems Require Special Handling

There are no "stock answers" to industrial water problems, for information, write, wire or call Hall Laboratories, Inc.

*"Banox," "Hagafilm" and "Burosil" are registered trademarks. "Hall System" is registered as a service mark by Hall Laboratories.

Have you a steam problem?



A Petro INDUSTRIAL OIL BURNER IS THE SOLUTION

HERE'S WHAT YOU NEED

You need to CUT STEAM COSTS

A Petro industrial oil burner will do it! The Petro burner is designed to burn low-cost heavy fuel oil with high efficiency and complete reliability. Saves money year after year.

You need to CUT LABOR COSTS

A Petro oil burner will do that, too! Completely automatic, it regulates itself without constant attention; frees attendants for other duties.

You need to MEET FLUCTUATING STEAM DEMANDS

A Petro industrial oil burner does just that! The fire can be modulated to meet the most extreme requirements of varying steam loads.

You need to do all this AT LOW COST without replacing your present boiler equipment.

Petro industrial oil burners and combination oil-gas burners are your best buy! They operate with high efficiency in practically every type of boiler.

Petro oil burners have world-wide acceptance. Their dependability is traditional. They are recommended by leading heating contractors everywhere. Fifty years in oil firing gives the Petro organization an exceptional degree of engineering experience and practical "know how."

Petro's outstanding ability to burn heavy, low-cost oils with maximum efficiency has reduced fuel costs in thousands of plants and buildings.

See Petro section in Sweet's Architectural File, or write for catalog and specifications to Petro, 3216 W. 106th St., Cleveland 11, Ohio.

50 Years of Leadership in Automatic Heating and Power Equipment

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T. M. REG. U. S. PAT. OFF.

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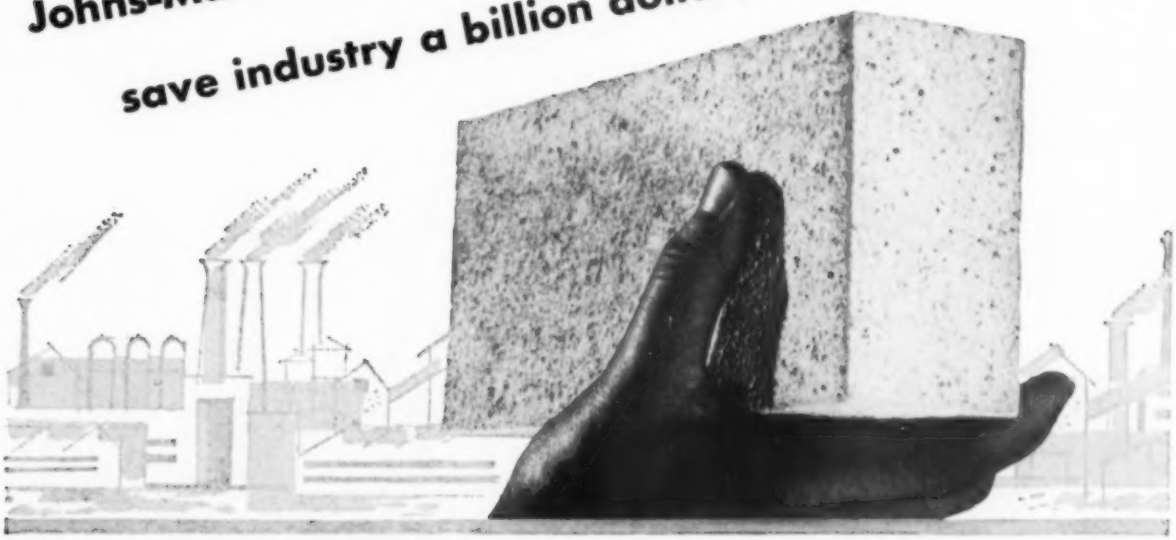
INDUSTRIAL AND COMMERCIAL OIL, GAS AND COMBINATION OIL-GAS BURNERS, RESIDENTIAL OIL BURNERS, OIL AND GAS FURNACES AND BOILERS.

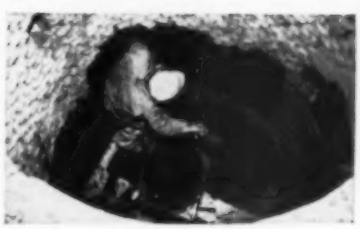
Johns-Manville Insulations save industry a billion dollars in fuel every year!



Reduce your fuel costs and build better furnace linings with JM-3000 INSULATING FIRE BRICK

HERE'S THE ONLY insulating fire brick that withstands a full 3000F. It's highly efficient both as an exposed refractory lining or as back-up insulation. And JM-3000 is only one of six types of Johns-Manville Insulating Fire Brick made for these applications. All provide long-life insulation. All are light in weight, have low conductivity, high structural strength. These properties permit thinner furnace walls—yet you can achieve important fuel savings and increased production, because J-M Insulating Fire Brick assures quick furnace response.

Sil-O-Cel* Insulating Brick is another outstanding J-M fuel-saver . . . a high load-bearing brick for back-up insulation behind refractory linings. It comes in three types, for service through 2500F—makes it possible to reduce the necessary thickness of refractory linings as much as one-third.



Save fuel with J-M Hydraulic Setting Refractories

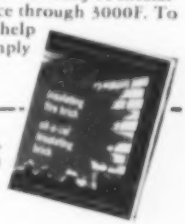
Johns-Manville refractories meet every need for castable, troweling and gunning applications for temperatures through 3000F. *Firecrete** is used to cast special shapes of all kinds. It is ready for use within 24 hours, has negligible shrinkage and high resistance to spalling. *Blazecrete** is used to build and repair furnace linings. When gunned, it adheres readily with a minimum of rebound loss. When slap-troweled, it eliminates laborious ramming and tamping.

Save Fuel with J-M Aggregates and Fills

These lightweight insulations are used as fills to conserve heat in irregular spaces where other forms of insulations cannot be economically applied. They are also used as aggregates for mixing with other materials to form insulating refractory concrete.

*Reg. U. S. Pat. Off.

Send for your free copy! This new booklet IN-115A gives full details about J-M insulating materials for service through 3000F. To find out how they can help cut your fuel costs, simply mail coupon.



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Please send me, without charge, copy of brochure IN-115A

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Company_____

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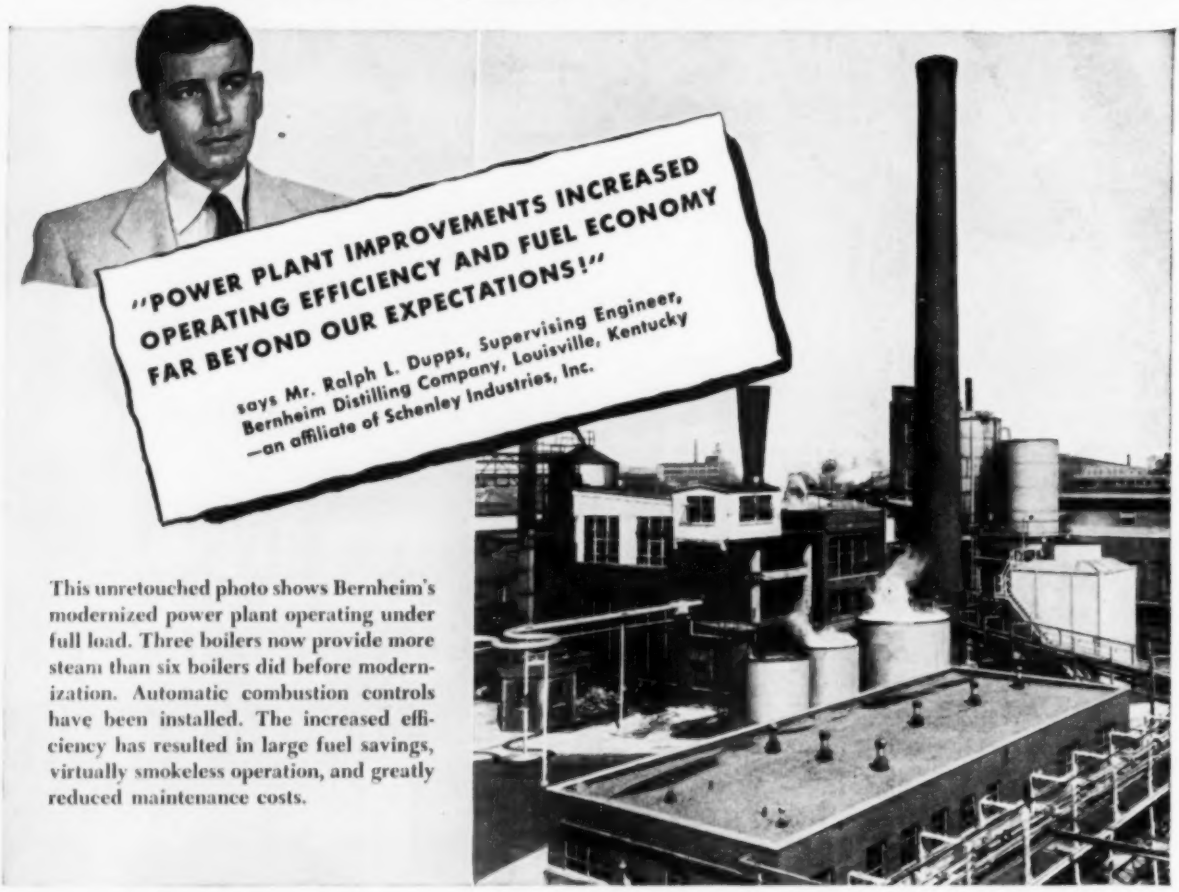
"WE CUT OPERATING COSTS $67,000 A YEAR— BY BURNING COAL THE MODERN WAY!"


"POWER PLANT IMPROVEMENTS INCREASED OPERATING EFFICIENCY AND FUEL ECONOMY FAR BEYOND OUR EXPECTATIONS!"
says Mr. Ralph L. Dupps, Supervising Engineer, Bernheim Distilling Company, Louisville, Kentucky —an affiliate of Schenley Industries, Inc.

This unretouched photo shows Bernheim's modernized power plant operating under full load. Three boilers now provide more steam than six boilers did before modernization. Automatic combustion controls have been installed. The increased efficiency has resulted in large fuel savings, virtually smokeless operation, and greatly reduced maintenance costs.

Why not take *full* advantage of coal's economy? Cut your operating costs to a minimum with automatic coal- and ash-handling equipment. Get more steam for every dollar with an up-to-date combustion installation.

Whether you're building a new plant, or planning to modernize, a consulting engineer can show you how you can get big savings by burning coal in a modern plant designed to meet your *specific* needs.

Consider, too, that of all fuels, coal alone has virtually unlimited reserves. And America's coal industry leads the world in efficient, economical production. That means that, unlike other fuels, ample coal will be available in the future—and at relatively more stable prices.

If you operate a steam plant, you can't afford to ignore these facts!

COAL in most places is today's lowest-cost fuel.

COAL resources in America are adequate for all needs—*for hundreds of years to come.*

COAL production in the U.S.A. is highly mechanized and by far the most efficient in the world.

COAL prices will therefore remain the most stable of all fuels.

COAL is the safest fuel to store and use.

COAL is the fuel that industry counts on more and more—for with modern combustion and handling equipment, the inherent advantages of well-prepared coal net even bigger savings.

BITUMINOUS COAL INSTITUTE

A Department of National Coal Association, Washington, D. C.

FOR HIGH EFFICIENCY FOR LOW COST

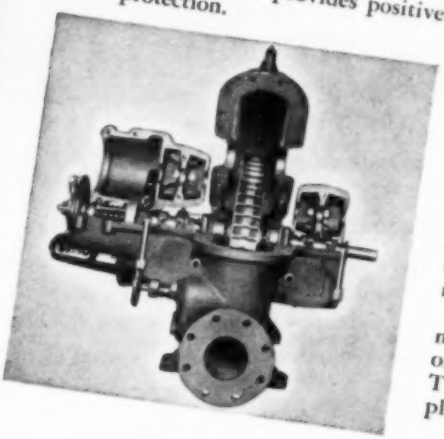
YOU CAN COUNT ON COAL!

TERRY

PROTECTION OF TURBINE BLADES made possible by nozzle location

The Terry Solid-wheel Turbine is of the impulse, helical flow type. The steam issues from an expanding nozzle at high velocity and enters the wheel bucket where its direction is reversed 180°. As this single reversal uses but a portion of the available energy, the steam is returned to the wheel several times until practically all of the energy has been utilized. This principle makes possible the efficient use of steam in a single-piece, almost indestructible wheel.

In the Terry Solid-wheel Turbine, the steam enters the buckets in a direction at right angles to the shaft, as shown above. This design eliminates the need for close clearances and provides positive blade protection.



The blades cannot foul. There is a one inch clearance on either side of the wheel. In addition, projecting rims on each side of the buckets prevent damage to the blades even though external thrust should move the wheel.

This is only one of the many important features of the Terry Solid-wheel Turbine. Write for complete details.

THE TERRY STEAM TURBINE CO.
TERRY SQUARE, HARTFORD 1, CONN.

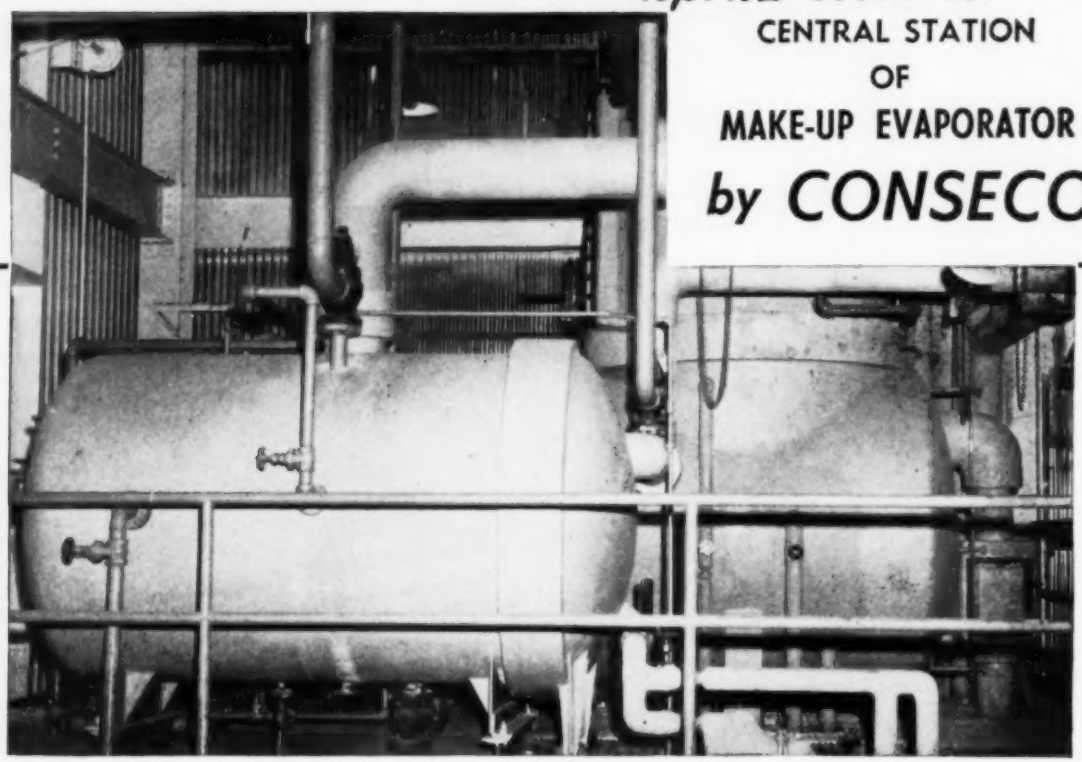
TT-1195

Memo

Send for a copy of bulletin S-116 which describes the many advantages of the Terry Solid-wheel Turbine.

"Quickly Repaid its Cost—"

reports SOUTHWEST CENTRAL STATION OF MAKE-UP EVAPORATOR *by* CONSECO



This Conseco Make-Up Evaporator is installed in a large central station in the Southwest. It is a horizontal internal tube nest type unit having a 54 in. diameter shell 154 in. long.

Its output capacity is 4,000 lb. vapor per hour at a purity of better than 4 ppm in the condensed vapor. The unit delivers vapor at 22 psia. using extraction steam at 62 psia. To facilitate bundle removal, the bundle is externally supported on heavy duty trucks and internally on slide rails.

The simplicity and cleanliness of Conseco evaporator design is another typical example of Conseco's many contributions to modern design and construction in power plant equipment. It will pay you to consult Conseco engineers on your requirements.

Write for helpful bulletins on Ejectors, Condensers, Evaporators, Boilers and Pumps.

CONSECO LINE includes: **BOILERS • CONDENSERS • STEAM AIR JET EJECTORS • DEAERATORS • CLOSED HEATERS**

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Completely machined and finished—ready for assembly—Bunting Standard Stock Bearings can be immediately installed in most machine tools and industrial machinery. Unusual requirements are quickly and economically met by slight additional finishing. Your local Bunting distributor stands ready to serve you at all times from his large stocks.

The Bunting Distributor

Your Bunting Distributor is an industrial distributor or a specialist in certain industrial items. You will find him listed in the classified section of your telephone book—most likely under the heading Bars, bronze or Bearings, bronze. If he is the leading distributor, he almost certainly is the Bunting Distributor. He carries in stock, for your money saving convenience, completely machined and finished Bunting Standard Stock Industrial Bearings, Electric Motor Bearings and Precision Bronze Bars in a complete range of sizes meeting all your usual production and maintenance needs. Ask him for catalog.

Bunting®

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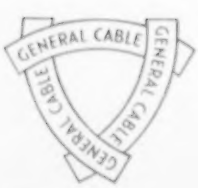

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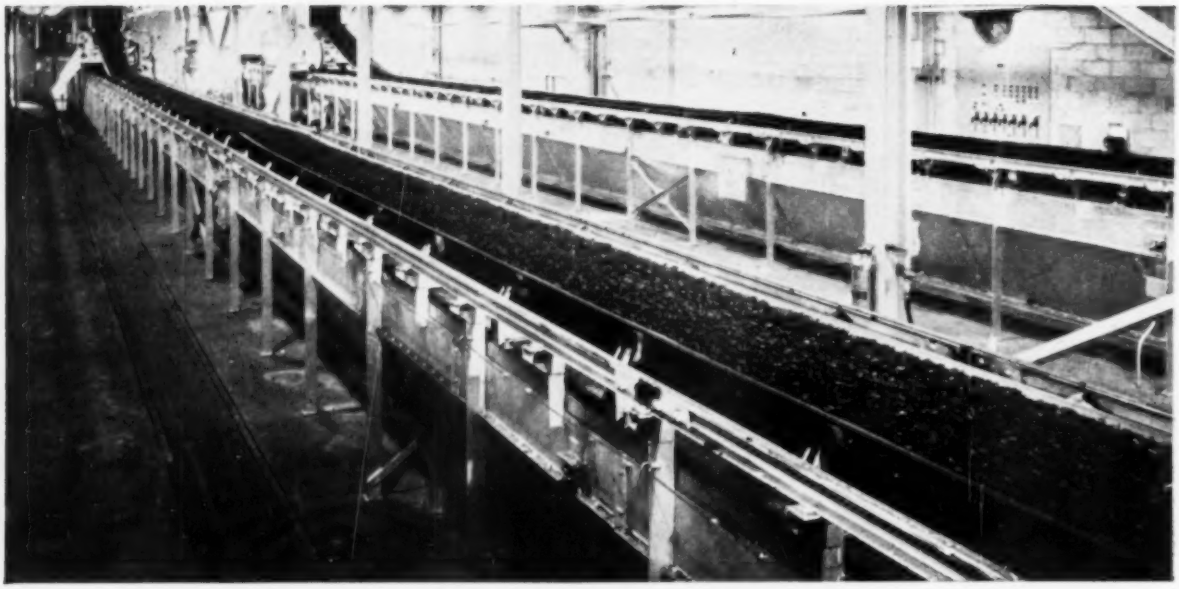

This power plant uses Link-Belt self-propelled trippers to discharge coal to bunkers from twin Link-Belt 36-in. wide belt conveyor systems, each handling 450 TPH.

TOTAL ENGINEERING

It's LINK-BELT's answer for improved belt conveyor performance

BELT conveyor efficiency begins with correct analysis of overall system requirements. And right from the start Link-Belt offers you unique advantages. Our engineers can apply broad experience to your bulk handling problems.

Working with a complete line of quality components, they can select the belt conveyor equipment best suited to your exact needs. What's more, Link-Belt has a nation-wide engineering organization that will follow through on every detail. This includes supplying all related equipment . . . building supporting structures and enclosures . . . erecting the complete job, if desired.

It's easy to see why "total engineering" results in top belt conveyor performance. For complete information, call the Link-Belt office near you today.

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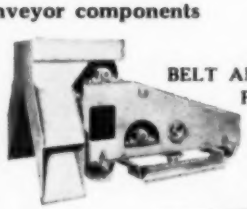

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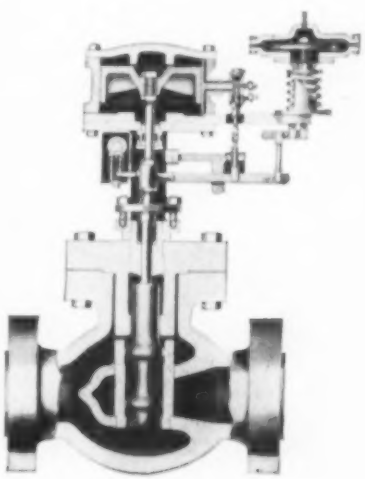
You'll get 'round-the-clock dependability for years to come—with any adjustments or maintenance easily handled by your plant personnel.

It all adds up to the kind of performance you need for your tough jobs—results you cannot expect if you buy on price.



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CONTINENTAL FOUNDRY & MACHINE COMPANY
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The COPES DESUPERHEATER

You'll find it easy to install the self-contained COPES Desuperheater. It goes into the line as a unit, with only three connections. All accessories are furnished. You need no extra steam atomizing valve with extra stop valves—no long run of alloy-steel steam piping—no extra piping from the temperature element to the spray nozzle—no other extras.

You'll also find your COPES Desuperheater correctly sized for low velocities—for minimum noise, vibration and wear. You'll find temperature control accurate—even on lightest flows—because cooling water is controlled and completely atomized inside the mixing chamber. Adjustment is simple and permanent.

The COPES REDUCING VALVE

You'll find your COPES valve ports accurately designed for the correct capacities under the flow and pressure conditions you specify. You'll have no "hunting" to upset the precision of your control.

You'll find extra-heavy construction throughout. The valve piston is supported and guided in the areas subject to greatest velocities and forces. If these forces could cause excessive erosion, Stellite is welded to all contact surfaces before they are precision-ground to correct clearance for your installation. You'll find design and construction minimizes the possibility of sticking, leaking or vibrating. You'll suffer no objectionable noise.

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Quick and **clean** to apply

UNIBESTOS®

PIPE INSULATION

IS EASY TO USE . . . WON'T CHIP,

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Fig. 19003 W. E. 900-pound Cast Steel Pressure Seal Gate Valve with welding ends. Also made for 600, 1500 and 2500 pounds W. S. P.

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That is why you'll find a greater variety of Powell Valves in service today than of any other individual make.

Shown here are a few of the many Powell designs for the modern Power Plant.

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NAVCO "Universal" PIPE SUPPORTS

Vertical adjustment up to 2½ inches can be made.

Support may be turned to any angle of 360°.

Will take care of 8 inches of travel.

Features

Universal Pipe Supports hold the pipe down as well as up. They prevent pipe from getting out of alignment, which is usual when Roller Supports are used.

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Expansion movement of pipe will not disturb the insulation.

Made in Cast Iron or Steel and provided with forced lubrication for lines exposed to the weather.

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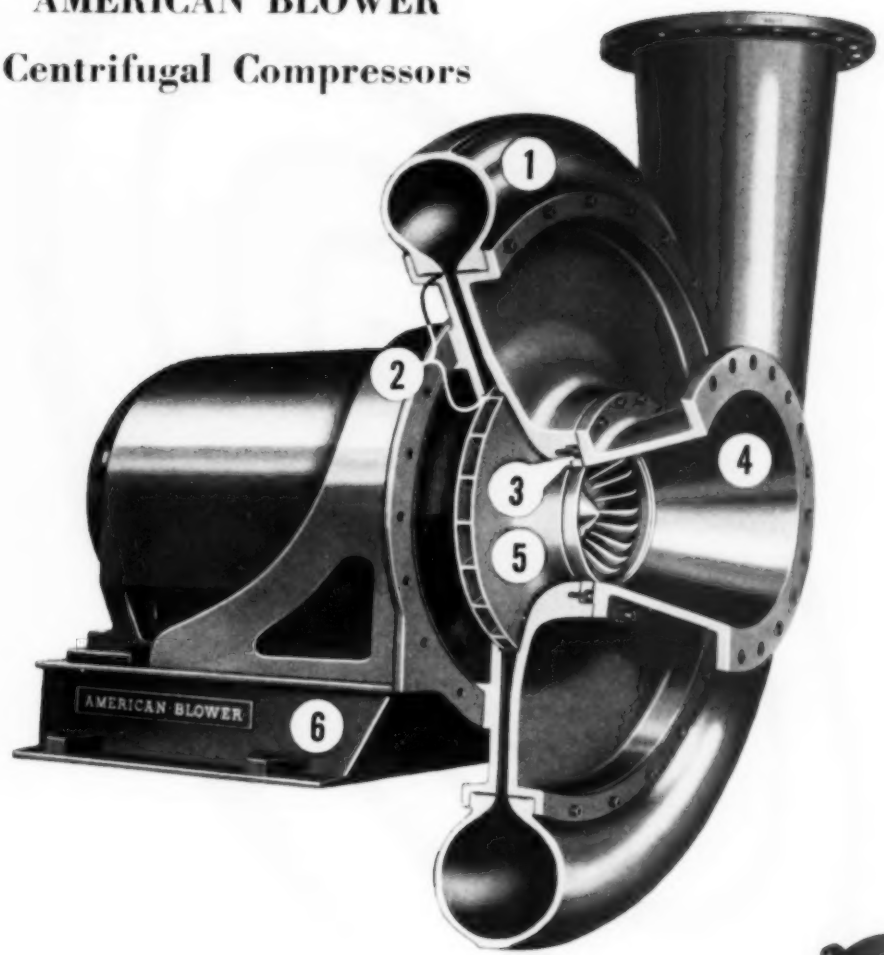
AMERICAN BLOWER

Centrifugal Compressors



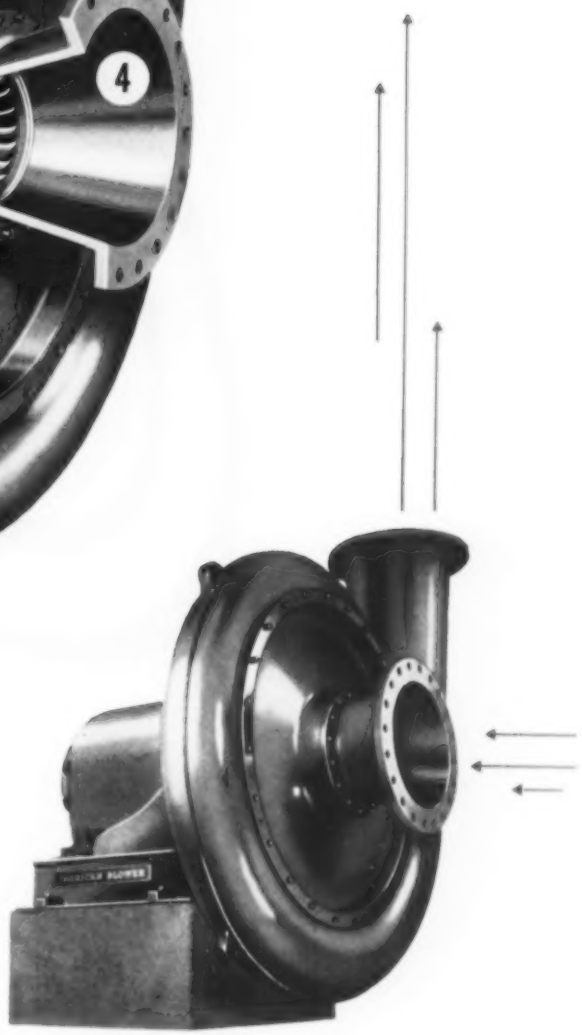
American Blower Centrifugal Compressors offer outstanding design features which improve efficiency, facilitate installation and minimize maintenance.

In the cutaway view, above: (1) Improved, scroll-shaped, casing design increases compressor efficiency. (2) Unobstructed diffuser passage efficiently converts velocity energy into pressure. (3) Annulus packing, having machined labyrinths, minimizes recirculation of gas around the impeller inlet. (4) Removable inlet nozzle. (5) Aerodynamic design of impeller blades results in high efficiencies. (6) Welded-steel baseplate "stress relieved" prior to machining, assuring maintained alignment.

For data, ask our nearest branch office.

AMERICAN BLOWER CORPORATION, DETROIT 32, MICHIGAN
CANADIAN SIROCCO COMPANY, LTD., WINDSOR, ONTARIO

Division of American Radiator & Standard Sanitary Corporation



American Blower Single Stage Centrifugal Compressors are available in sizes 30 to 600 h.p., and pressures $1\frac{1}{4}$ to $3\frac{3}{4}$ lbs.

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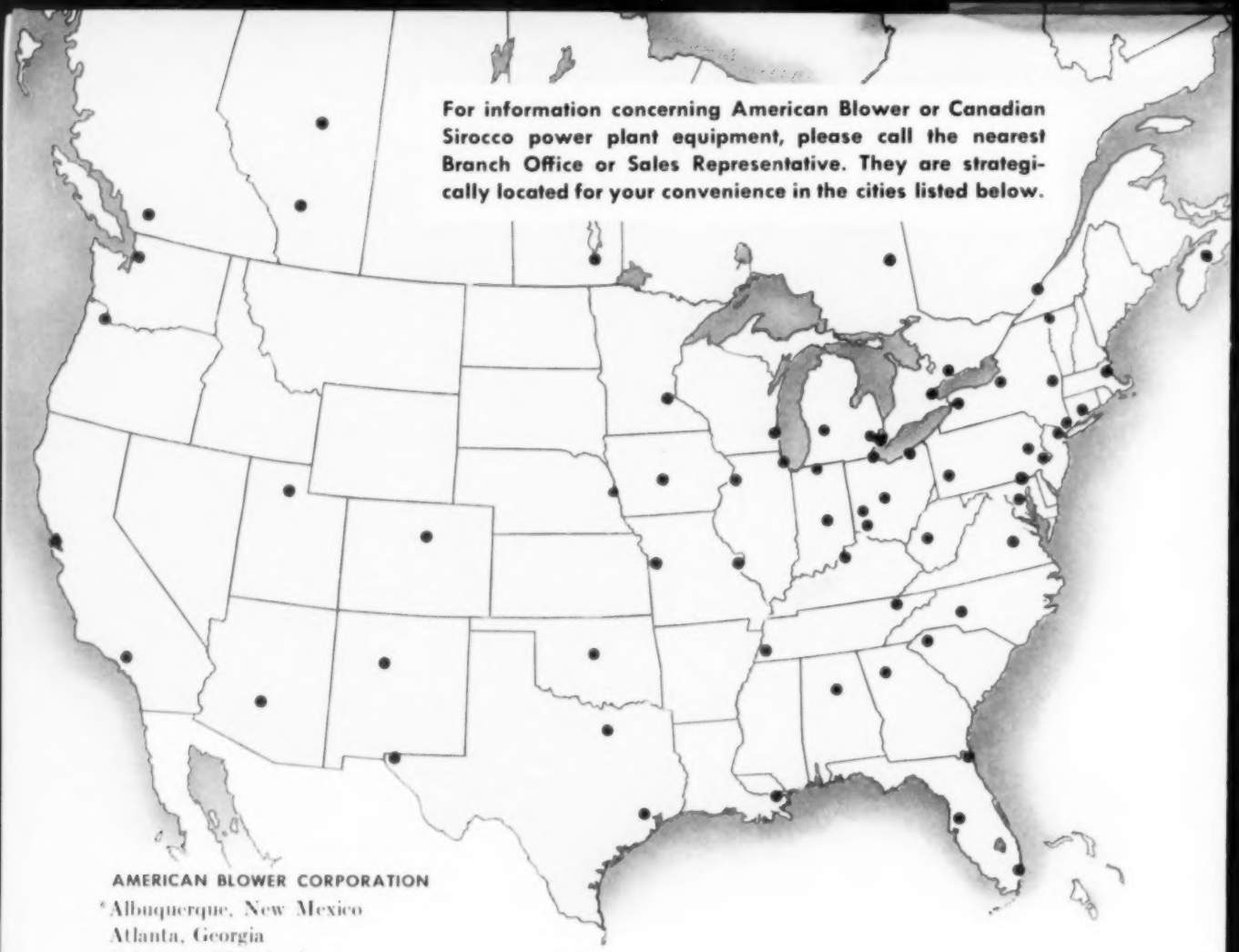

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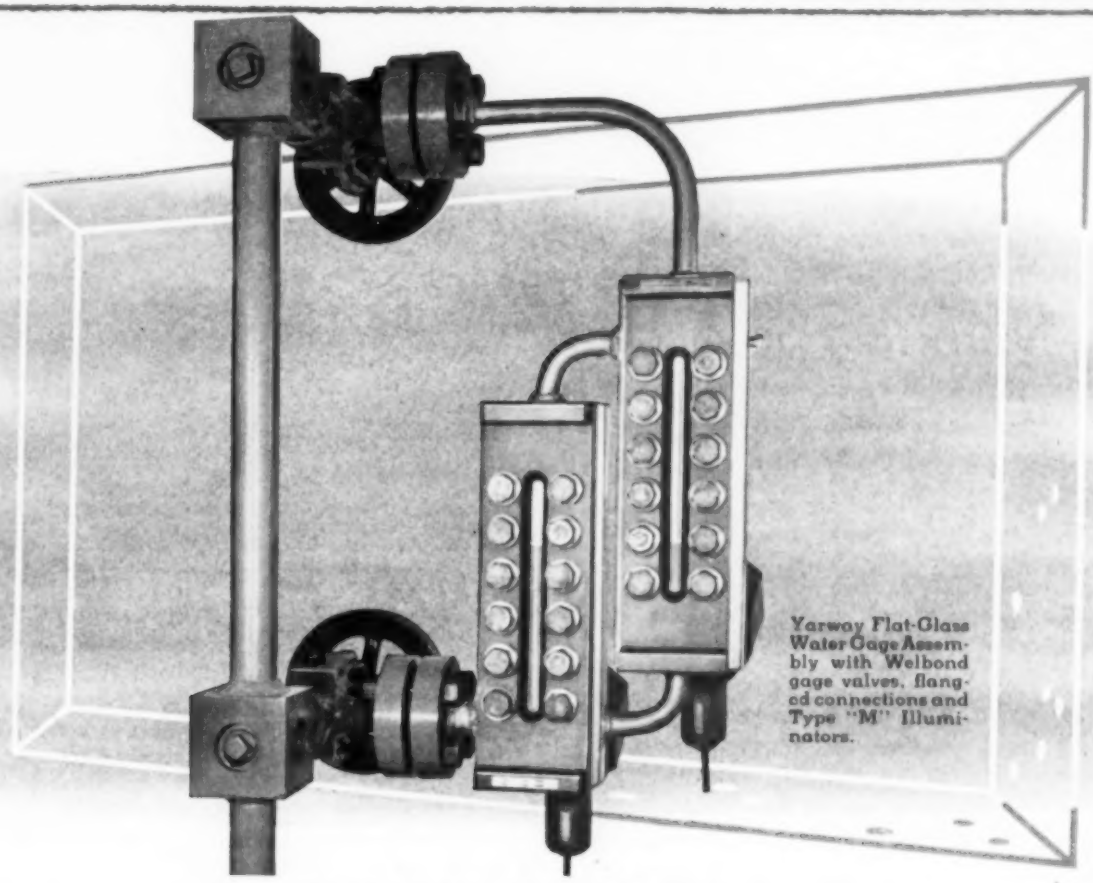
What's New

IN BOILER WATER LEVEL INDICATION?



Yarway Flat-Glass Water Gage Assembly with Welbond gage valves, flanged connections and Type "M" Illuminators.

NEW *SEPARATED-DESIGN* WATER GAGES

This new Yarway water gage assembly has been developed to meet the demands for greater dependability, longer life, and more accurate readings in high pressure service.

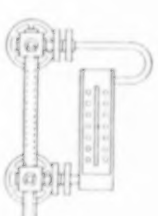
The gage glass inserts are of the Yarway pressure-sealed "floating assembly type". Yarway Welbond gage valves are used. Greater flexibility is gained by using two independent inserts, and by interconnecting expansion loops (see above).

The short connection to the drum assures greater accuracy of the gage reading, and the lower flanged connection eliminates a stuffing box. The upper flanged loop connection between the insert and gage valve allows expansion and contraction of the various components.

The tie bar-type water column linking the gage valves provides circulation to keep gage nearer drum temperature.

Yarway Type "M" Illuminators on the gage inserts cause the meniscus at water level to "shine like a star". This illuminator is especially effective in penetrating deposits on gage glass, dust particles in air and extraneous light.

For full information, write for Yarway Bulletin WG-1811.



Yarway Single Insert type gage for medium range of visibilities.

YARNALL-WARING COMPANY • *Home Office:* 116 Mermaid Ave., Philadelphia 18, Pa.

Southern Representative: ROGER A. MARTIN, Bona Allen Building, Atlanta 3, Ga.

YARWAY

STEAM PLANT EQUIPMENT

What it takes to make a 3000 Degree Refractory Concrete

Because of the widespread interest in the use of refractory castables, many furnace operators have asked us for the story behind the performance of B&W's unique refractory concrete, Kaocast.

Here are the answers to some of the most frequently asked questions:

Q. *When you refer to Kaocast as a 3000 degree refractory castable, do you mean that its melting point is 3000° F?*

A. No, this means that its service use limit is 3000° F; its melting point is 200 degrees higher.

Q. *Just what does it take to make a 3000 degree refractory castable like B&W Kaocast?*

A. Let's first define a few terms. Refractory castables are made with granular materials which are volume stable at high temperatures and which can undergo repeated heating and cooling cycles without disintegration. These materials, known as refractory calcines or grogs, are blended with suitable hydraulic binders. The initial strength of a refractory castable is thus developed in the same manner as that of ordinary concrete—that is, through the chemical action between water and the binder. A strong *ceramic bond* is formed when the refractory castable is subjected to temperatures above the vitrification point.

Q. *Then you have a grog, a binder and a method of putting them together. Which is most important?*

A. You can't say that any *one* is most important. It's a combination of all three. Let's take them one at a time. Our grog consists primarily of the proper blend of kaolin and other alumina-silica materials. This ratio enables us to achieve a grog with minimum expansion and shrinkage, a high fusion point, and greater stability under load, at varying temperatures.

Q. *And now, what about the binder?*

A. There are a number of factors responsible for the success of the Kaocast binder. One is the compound Tricalcium Penta-aluminate (3 lime to 5 alumina). This formula produces the most refractory compound (highest melting point) that can be made from lime and alumina. Another is that by using the purest commercially available lime and alumina, the Kaocast binder is substantially free of iron and silica. Such traces of these that are present combine during the pre-firing of the binder to produce stable compounds.

Q. *Just how important is the manufacturing or "blending" of the grog and the binder?*

A. If one factor could be singled out as "most important" it would be quality control.

Direct control over the fineness of materials, prefiring temperatures, and other phases of manufacture is possible at B&W because both the grog and the binder are made and blended at B&W's Augusta Works—under B&W's direct control and supervision.

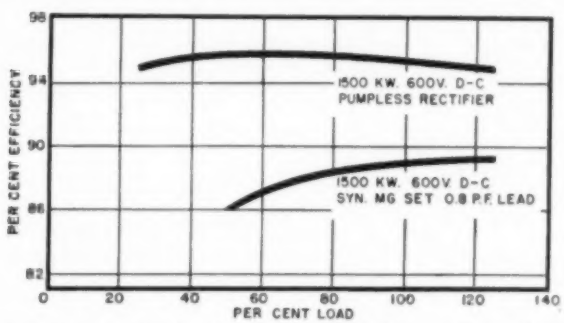
Q. *These factors you've discussed must add up to some specific advantages of Kaocast. What are they?*

A. B&W Kaocast has all the advantages of easy installation which are responsible for the widespread interest in refractory concretes, plus these exclusive features: It is the only 3000 degree refractory concrete with high resistance to spalling and low volume change throughout its operating range.

THE BABCOCK & WILCOX CO.
Refractories Division
General Offices:
161 East 42nd St., New York 17, N. Y.
Works: Augusta, Ga.

New G-E PUMPLESS rectifiers... today's answer for d-c power needs

EVERY IGNITRON TANK after assembly is enclosed in a helium-filled bag—part of a rigid leak test prior to shipment.



EFFICIENCY CURVES for 600-volt d-c pumpless rectifier and corresponding MG set—show main reason you'll pay a smaller power bill.

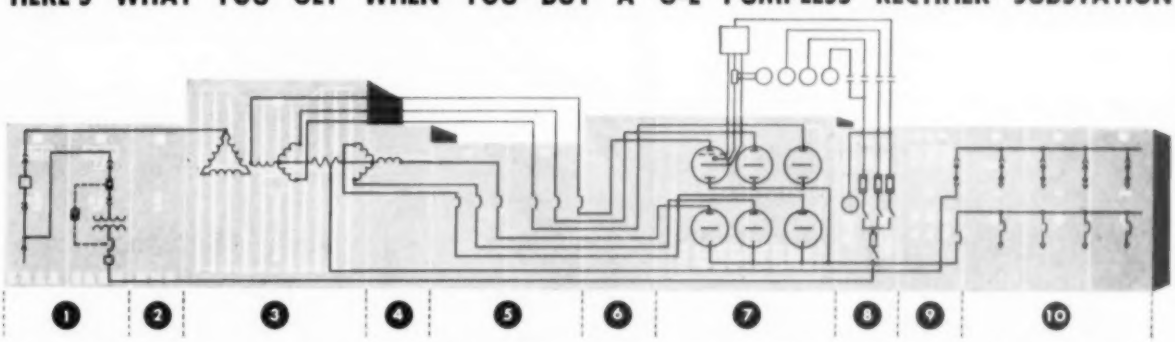
Sealed tank, design simplicity and 'packaged' installation assure low-cost conversion

General Electric Pumpless Rectifiers in your d-c unit substations give inexpensive d-c power by *eliminating the vacuum pumping system* found in conventional tank-type rectifiers . . . lowering installation, maintenance and power costs . . . and freeing valuable floor space for other use.

Featured in the rectifier itself is a semi-permanently sealed tank which holds its vacuum without pumping, yet does not have to be discarded in case of failure. In addition, the rectifier has been designed with a minimum of moving parts to assure greater operating efficiency . . . at lower operating cost. And since the rectifier is part of an integrated unit, there is no wiring to be done after delivery.

Complete information on G-E Pumpless Rectifiers is now available in a new bulletin. Easy-to-read, it graphically shows how you can apply low-cost d-c power conversion benefits in your own plant operation. For your copy, write for "Pumpless Rectifiers," GEA-5689. General Electric Co., Schenectady 5, New York. 883-1

HERE'S WHAT YOU GET WHEN YOU BUY A G-E PUMPLESS RECTIFIER SUBSTATION



1 A-C SWITCHGEAR SECTION
2 TRANSITION COMPARTMENT
3 TRANSFORMER SECTION
4 TRANSITION COMPARTMENT
5 ANODE BREAKER SECTION
6 TRANSITION COMPARTMENT
7 RECTIFIER SECTION
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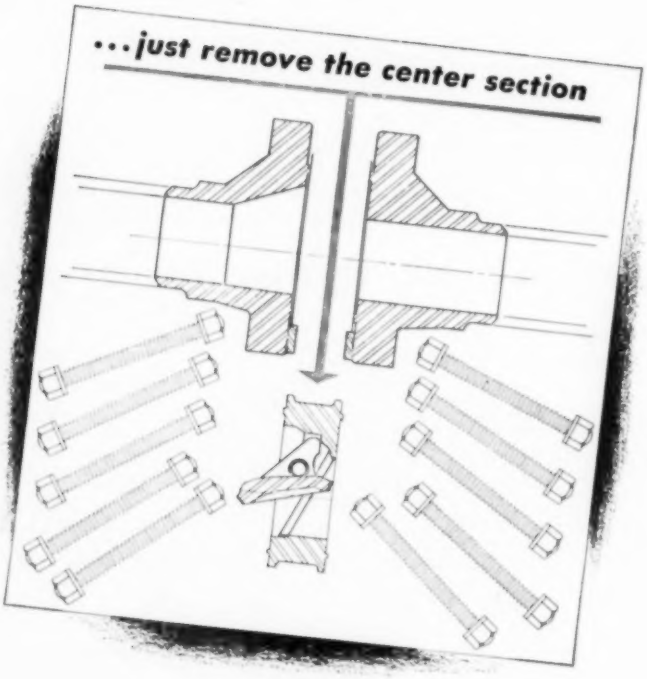
GENERAL ELECTRIC

NO NEED to cut this valve out of a Welded Line

...it's a CHAPMAN 3-PIECE TILTING DISC CHECK VALVE

Remove studs between inlet and outlet ends. Then the whole center section can be slipped out *as a unit* . . . and quickly and easily replaced. Figure the savings for yourself!

Here, Chapman design gives you the smooth operation and quiet closing of the 2-piece Tilting Disc Check Valve . . . with the unique advantage of practically immediate interchangeability of "the works." And *only* Chapman makes this complete line of Tilting Disc Check Valves. Send for your Chapman "Check Book" — *now!*



The Chapman Valve Mfg. Co.
INDIAN ORCHARD, MASSACHUSETTS

Timely Comments

Where is The Spirit of '76?

Following is a statement on the New England-South controversy by H. McKinley Conway, Jr., Director of the Southern Association of Science and Industry, Atlanta, Georgia, and Editor of the Journal of Southern Research.

The SASI is the South's foremost development body, having been established in 1941 to study and develop the resources of the region. Dr. A. P. Black, Florida scientist and educator, is the current President of the SASI.

UNTIL recent years, we have regarded New Englanders as the staunchest advocates of independence, industry, and all the other basic virtues which characterized those who built our country. We have admired their rugged individualism and have attempted to emulate their thrift and enterprise. But Paul Revere and his compatriots must be whirling dizzily in their graves today as they observe the course advocated by some leaders in their region.

New Englanders are concerned, of course, by the fact that their region is not keeping pace with other sections in economic progress. New England leaders are particularly sensitive to the shift of the textile industry to the South, although this trend has been inevitable for many years. There seems to be a general feeling Up East that the future of the nation is black.

So what do New England leaders of 1953 propose to do? Here are some recent proposals:

A committee of the New England Governors' Conference suggests that restrictive labor union activities be promoted in the South. Means must be found to reduce the output per worker in the South, they say, pointing out that "in one Southern plant 150 workers were found doing as much work as 300 workers in a New England plant."

Representatives of New England states in Congress have another solution. They advocate giving large defense orders to their lagging plants, even though suppliers in other regions submit lower bids. Thus, the nation's taxpayers would pay for the lower productivity of New England mills.

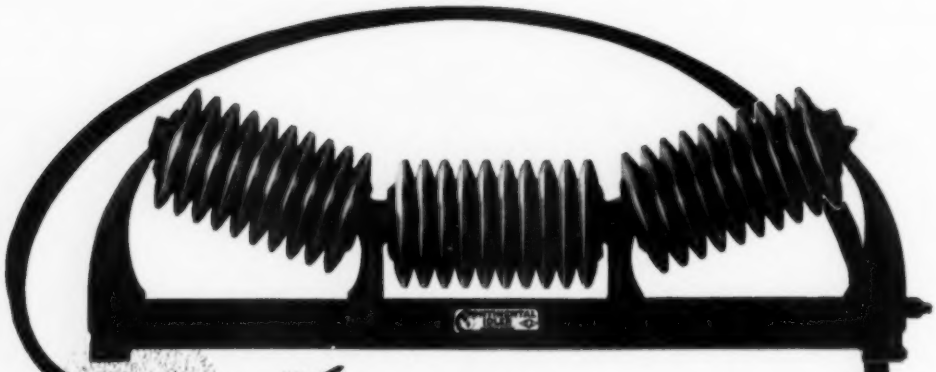
Other New Englanders have been loud in their criticism of some of the industrial financing systems, such as the Mississippi BAWI plan offered in the South. So what do they suggest? They are noisily setting up similar plans in Rhode Island and Massachusetts, apparently to out-socialize us.

Now, the remarkable aspect of this regional bickering—which aids no one—is that the responsible leaders of New England feel that the cure for their retarded economic development lies in getting handouts from Washington, hamstringing the opposition with union organization, or developing bigger and better give-away programs.

Where, in 1953 New England, is the spirit of 1776? Where are the men who had faith in the future of this nation, who asked only an opportunity to compete in a free economy, and who built financial empires by outproducing and outselling their competitors?

Do the New England leaders of today not realize that productivity is still the key to industrial success? Do they not know, with all their elaborate research facilities, that the future growth of their business is dependent on improving processes and creating new products?

It should hardly be necessary for us to remind our New England friends that the cotton gin was not invented in Washington. Nor did our petroleum industry spring from legislative action. **The great developments in industry in any region come only from constructive efforts—the manufacture of better products at lower cost**—and those who overlook this basic fact are bound to fall behind.



Continental IMPACT IDLERS — the BIG Difference...

In Conveyor Belt Life

Insist on Continental Impact Idlers under the loading point of your conveyors:

1. Absorbs greater impact

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3. Lower belt maintenance

Here's a typical installation that is really paying off—a Continental Shuttle Conveyor handling 600 TPH at 350 FPM. Systems such as this are constantly proving the value and reliability of Continental Conveyor Equipment.

Specify CONTINENTAL CONVEYORS

Write for your copy of Engineering Data Book ID-481-A "Continental Belt Conveyors"

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CONTINENTAL GIN COMPANY
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Industry Speaks

Why We Want Atomic Power

Adapted from remarks by Gordon Dean, Immediate Past Chairman, United States Atomic Energy Commission, before the Annual Meeting of the Edison Electric Institute.

WE want atomic power because there is a demand for it. We know this because of the intense interest demonstrated by so many industries and businesses in it. One might conclude that if there is a demand for atomic power, it must be worth going after.

But this is hardly a national policy reason for pushing toward the early development of an atomic power industry in this country. A good national policy reason would be provided, of course, if we were on the verge of running out of coal, oil or gas in a year or two. But we are not. This may be true of others, but it is not true of the United States.

Why, then, do we want atomic power? I think we want atomic power because as soon as it comes into being it will reduce the rate at which we are using up our other natural resources. It will release them for other uses or permit us to conserve them for future specialized use.

We want atomic power because our demand for energy in this country and in the world is increasing at an enormous rate, and the costs of producing such fuels as oil and gas will steadily rise as the supplies dwindle. We will need a supplementary source of energy, and to be ready when the time comes we must push ahead now.

We need atomic power because atomic fuels are virtually weightless fuels. They can be taken anywhere in the world—to the source of the raw materials upon which industries are based—to deserts, to mountains, and to islands.

We need atomic power so that we may help our friends in the world who are in need of new sources of power. I have particularly in mind those who have been and are supplying us with the uranium with which we are feeding our weapons program.

And I think we need atomic power because no one really knows the enormous impact this new source of energy may have on our economy and our mode of life. I have heard that there were people who asked Henry Ford, "Why do we need the automobile when we can get where we're going quicker on a horse?"

Right now our objective is to advance our atomic power technology to the point where it can compete with the "horse" that is coal, gas and oil. But that is just the beginning. I know, and I think we all know, that there is more in the atom than that.

Ten Points for Advancement

Adapted from remarks by Dan. J. Haughton, vice president and general manager of the Georgia Division, Lockheed Aircraft Corporation, Marietta, Georgia, before the graduates of the Southern Technical Institute.

THE industrial road to success is, of course, a two way street. But from industry's standpoint the following are ten points for advancement:

1. Industry respects the graduate who seeks and obtains his job on his own, with only the aid of the placement bureau of his school, and without the help of influential friends and family. This gives the newcomer more confidence and industry feels more confident of the newcomer.

2. Industry expects absolute integrity and honesty, regardless of circumstances. This quality must be a part of a man's character.

3. Drive and enthusiasm are essential. This means thinking of work as a pleasure and the realization of an ambition. No one should stay on a job for a long period of time if he cannot work it into a challenge. The newcomer should do more than is asked and more than is expected.

4. Dependability. This starts the first day at work and it means being on the job before the prescribed time and staying on the job throughout the working day. A company can be no more dependable than its people.

5. A man should have loyalty to his company and to the individual employee both on and off the job. Lack of loyalty hurts the company and its supervision, but most of all it hurts the individual.

6. An open mind that is willing to continue learning. Men with more experience will eagerly help the man who honestly wants to learn. Ideas come from below as well as from up top.

7. Humility is a great asset. To me the greatest sales point of human character is humility, and the larger the job you advance to, the more important humility becomes. Progress will come faster to those who practice humility from the start. And humility does not mean letting someone walk over you.

8. Keep an even disposition. Criticism will have to be accepted at times, as well as praise. If the boss did not think you were susceptible to help, he would dispense with your services.

9. Be kind and be just a "plain human being."

10. And, finally, fulfill your obligations to your God, your country, your family, and to your community. The activities other than your work will give you a source from which to draw strength when you need it.

STEAM and POWER EXPANSION

Shell Oil Company's Houston Refinery

miniature indicators and control units

. . . demineralization by ion exchange

EXPANSION of Shell Oil Company and Shell Chemical Corporation at their Houston, Texas plants has brought about a steadily increasing demand for steam and electric power for the past eight years. During these years the demands were met by installing additional capacity at the location of the original steam generating plant.

The development of large demands at locations considerably removed from the original steam generating site, plus limited space at that location, indicated the desirability of meeting further load increases by building an entirely new steam generating plant in an area near the new load centers and with adequate space for expansion.

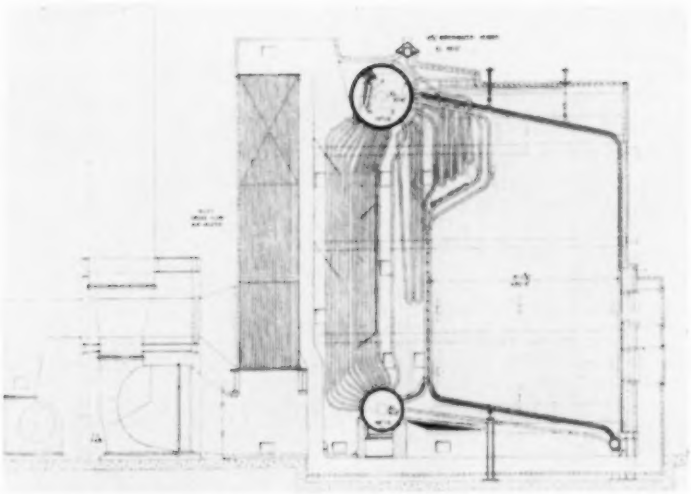
Such a site was available approximately 0.75 mile from the existing facilities and this new phase of steam generation expansion has begun. Shell Oil Company and Fluor Corporation, Ltd., collaborated on the plant design. Actual construction was carried out by Fluor Corporation, who acted as general contractor. At the time of writing, one new boiler and a new water treating plant are in operation. A second boiler is under construction. Present plans are that this plant's primary purpose will be to supply high pressure (650 psi) steam to large turbines in processing plants. These turbines are of the topping type and exhaust at 200

By C. A. SCHAEFFER

Utilities Department
Shell Oil Company
Houston, Texas

This is the air conditioned control room in Shell Oil Company's Houston Refinery. Pressurized piping has been eliminated from the control room by the use of pneumatic transmitters on all measured factors of flow, pressure, level, draft and speed.

Note how the Bailey Meter Mini-Line console control places all controls within operator's reach.



Section of the Riley 250,000 lb/hr, 650 psi, 750 F steam temperature boiler.

psi. The lower pressure steam is used to drive prime movers and for processing. A 16 in. header connects the 650 psi steam systems of the new and existing boiler plants.

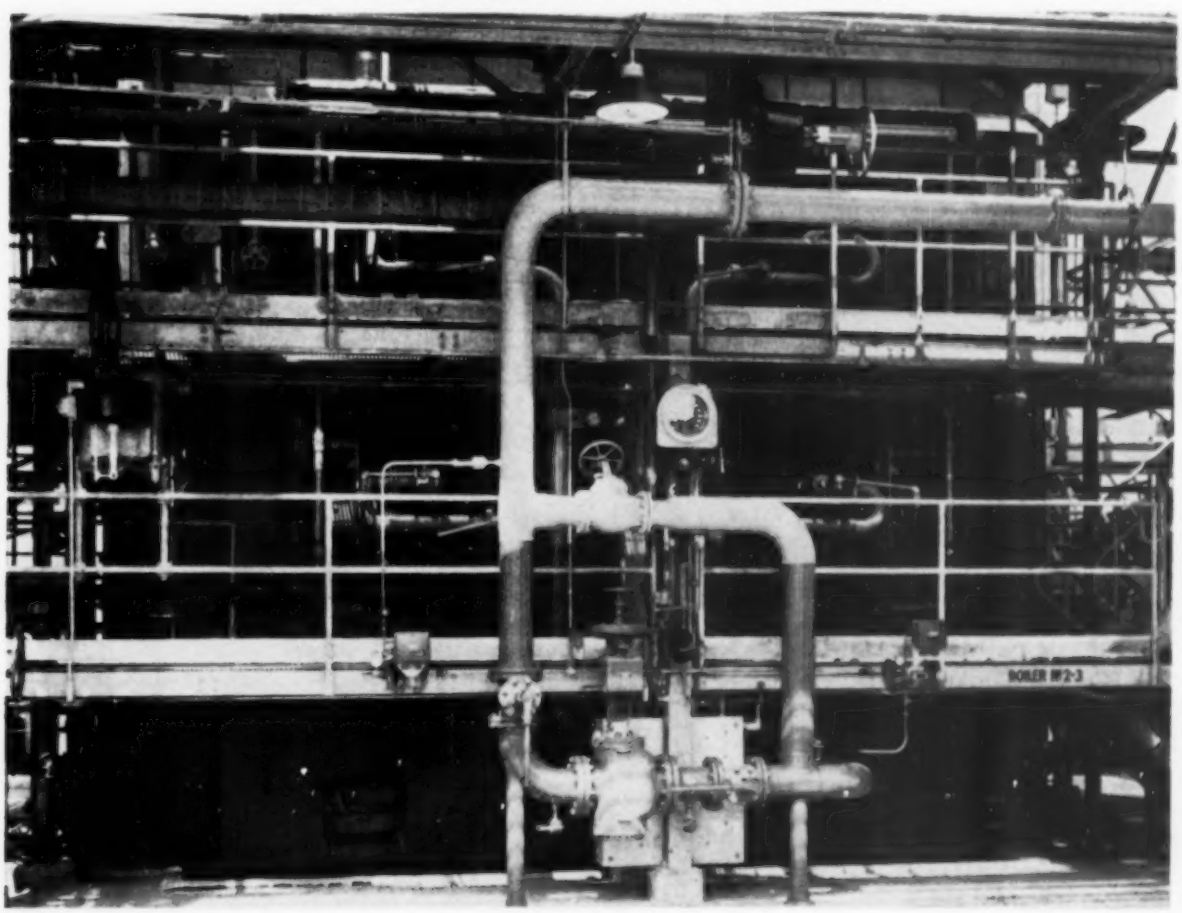
The new plant is of outdoor design. The only sheltered locations are two brick, air conditioned buildings that house the controls for the boilers and water treating plant.

Arrangement of the equipment now installed and design of the control rooms are such that further expansion can be carried out with minimum amount of interference with operations. Two-way radio communication is available between the two boiler plants as well as telephone. Both plants have inter-com systems that can also operate over the two-way radio. Since the two plants are physically connected with each other as well as to processing plants by the 650 psi steam system, close liaison is necessary.

Steam Generators

The boilers are Riley 250,000 lb/hr, 650 psi two-drum units with forced and induced draft. Each is equipped with Riley high velocity superheaters producing a final steam temperature of 750 F. The distribution of heating surface is as follows: boiler, 16,985 sq ft; superheater, 4800 sq ft; water walls, 7530 sq ft.

The Riley Stoker Corporation boiler is entirely of outdoor design. Fuel gas regulating valve and burners are accessible from ground level and two platforms, respectively.



Typical Selector Valve Operation

These valves provide all necessary indications and control knobs for complete automatic or manual operation of the pneumatic control system. Four indicated air pressures are vital to the control system.

Pointer "A" indicates the boiler drum level in terms of the output air pressure from the pneumatic drum level transmitter. Pointer "B" indicates the drum level which the control is set to maintain. This set point may be adjusted by the middle knob.

When the selecter valve is in the "Hand Control" position, pointer "C" indicates the pressure which the automatic control is calling for while pointer "D" indicates the pressure actually being manually applied to the diaphragm operated feedwater regulator valve. When the selecter valve is in the "Automatic Control" position, pointer "C" indicates the pressure being developed manually while pointer "D" shows the pressure which the automatic control is sending to the feedwater regulating valve.

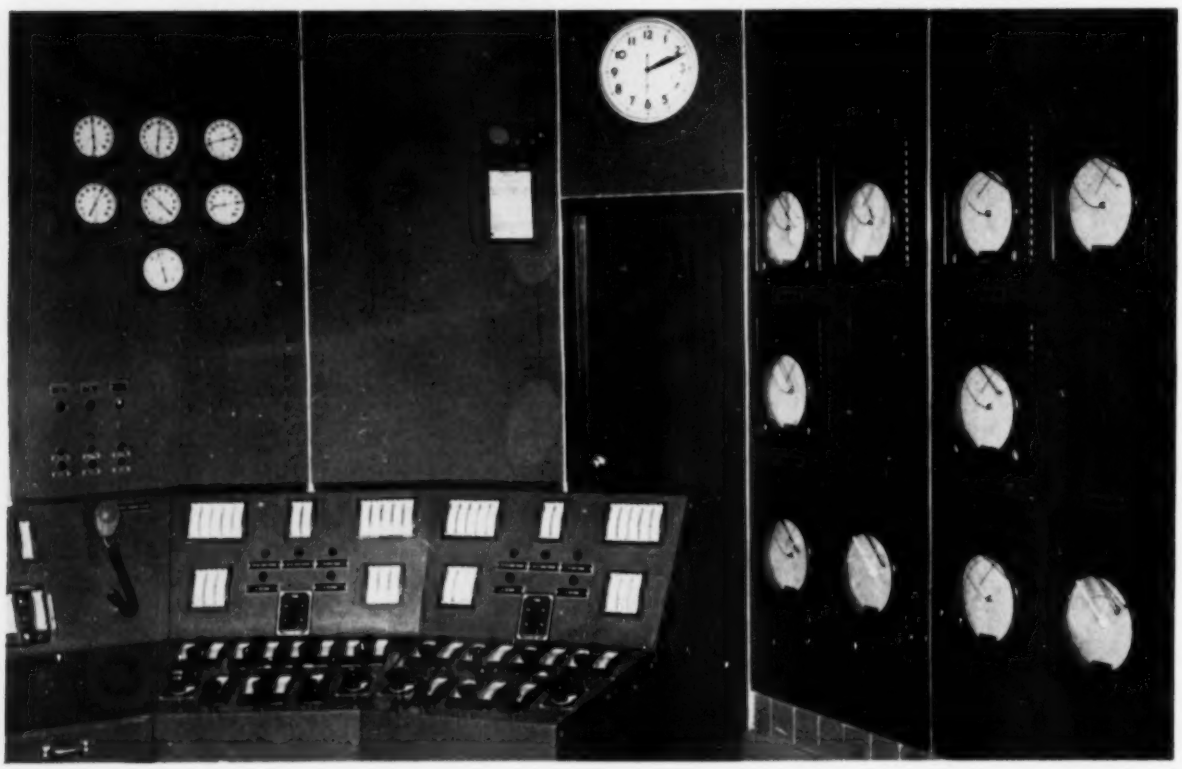
To transfer from hand to automatic control, pointer "B" is adjusted by the middle knob to the pressure corresponding to the normal water level. While manually controlling the feedwater with the bottom knob, the level is actually brought to normal as indicated by the coincidence of pointers "A" and "B". At this time pointers "C" and "D" will be equal to each other. The control is then placed on automatic by switching the top knob to the automatic position.

To transfer from automatic to hand control, pointer "C" is moved to coincide with pointer "D" by adjustment of the bottom knob. The top knob is then switched to the hand position.

Typical selector valve is this Bailey Meter Type AM62-1 Set Point Selector.

Each boiler is fired by four Forney combination gas-oil burners. The oil burners are of the steam atomizing type. The primary fuel is a blend of natural and refinery gases. Oil is burned only for short periods and is required only as an emergency measure. Since little or no oil burning is antici-

Another view of the air conditioned control room. Boiler controls and indicating instruments are mounted on the console panel. Recording instruments are mounted on the vertical panel behind the console.



pated, a light gas oil is used rather than the conventional grade of fuel oil. This eliminates the need for oil heating facilities and provides a standby source of fuel that presents few handling or firing problems.

Draft Fans

Combustion air is supplied by a forced draft fan of 375,000 lb/hr capacity. The drive is a 273 hp turbine fitted for speed control. Air temperature is raised from 80 F to 450 F by a Riley tubular, single pass, cross-flow preheater with 25,000 sq ft of heating surface. Combustion gases are removed from the furnace by an induced draft fan of 400,000 lb/hr capacity. The drive is a 276 hp turbine similar to that used on the forced draft fan. Each boiler has a 7 ft diameter, 75 ft high (above ground) stack to receive the discharge from the induced draft fan.

Feedwater Pumps

Feedwater is supplied to the boilers at 250 F by three four-stage, 638 gpm, 1875 ft TDH pumps. Two are driven by 450 hp turbines and one by a 2300v, 450 hp motor. One of the three pumps is used as a spare.

Miniature Indicators and Control Units

All boiler controls, pressure indicators and steam flow meters are in a central, air conditioned control room located at ground level. Pressurized piping has been eliminated from the control room by the use of pneumatic transmitters on all measured factors of flow, pressure, level, draft and speed. Boiler meters, feedwater control and combustion control were furnished by the Bailey Meter Company. Recording instruments are mounted on a vertical panel. All Bailey Mini-Line indicating and control instruments are mounted on a sectionalized console located in front of the recorder panel.

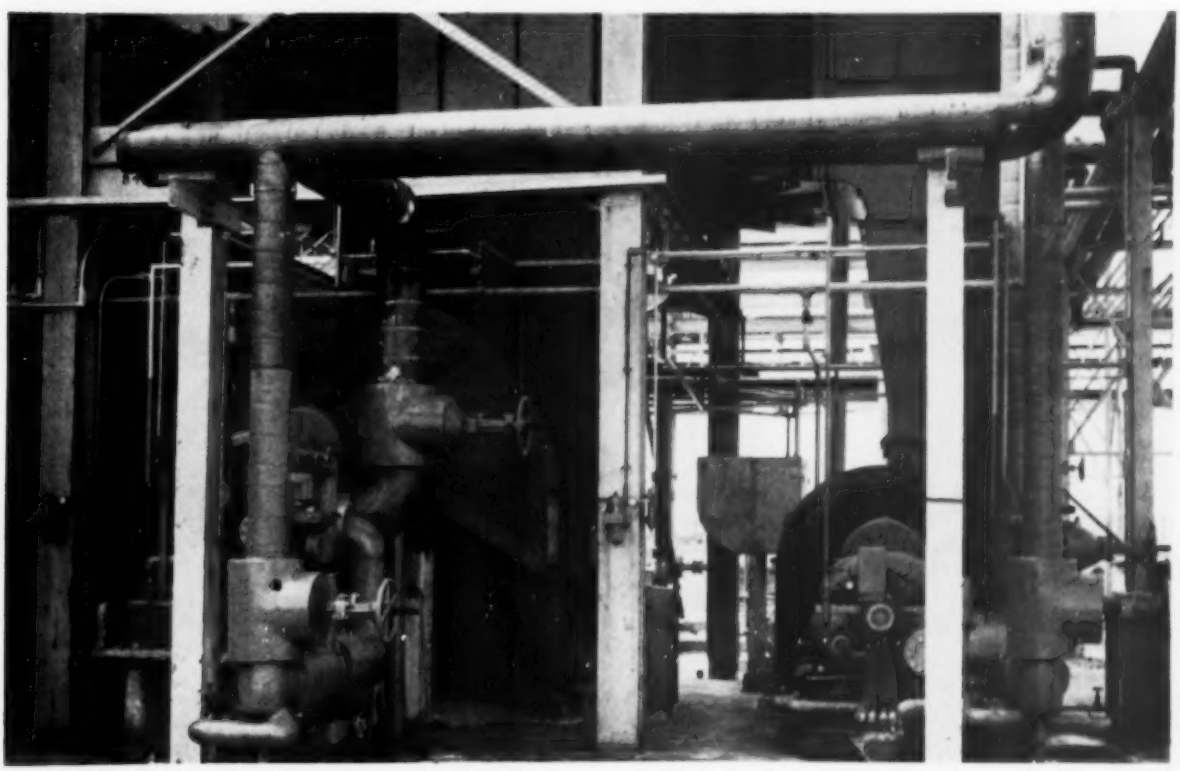
The flow transmitters for the boiler are of the square root extracting type so that air pressures developed by the pneumatic transmitters vary directly with changes in rates of flow. All transmitters are mounted as close to the point of measurement as is consistent with accessibility from the standpoint of maintenance.

The primary focus of the operators attention is the sectionalized control console which provides an inclined control panel at approximately desk height, with a nearly vertical indicator panel sloping upward from the control panel. One console section is provided for each boiler. On the central, master control section, indicators and control are on the nearly vertical panel in order to provide a desk area for the operator.

The Mini-Line indicators are vertical scale type pneumatic receivers and are so grouped that the "pointer pattern" is made use of to facilitate scanning by the operators. The control panels of the boiler consoles include the necessary remote manual-automatic selector valves, selector switches and remote manual loading stations. A typical selector valve operation is described.

The Bailey combustion control system functions in the following manner. The 650 psi steam header pressure actuates the master steam pressure controller which, in turn, controls the fuel simultaneously on each boiler. The induced draft on each boiler is controlled in parallel with the fuel but is readjusted by

Forced and induced draft fans are driven by speed controlled turbines.



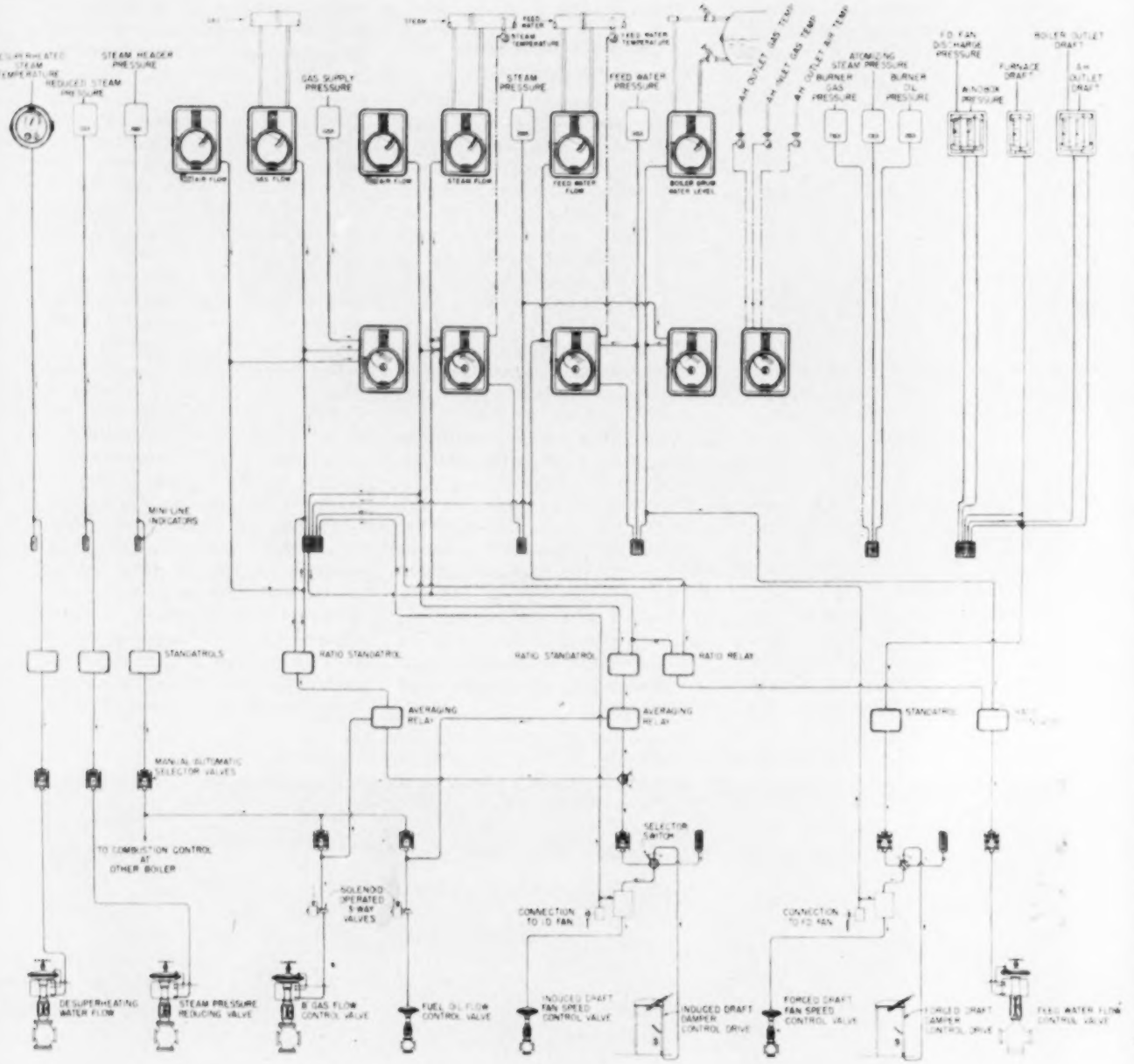


Diagram of instruments, combustion control and feedwater control systems.

either gas flow-air flow or steam flow-air flow ratio depending on whether the fuel be gas or oil. If variations in the heating value of the fuel gas prove to be excessive, steam flow-air flow ratio will also be used to reset the induced draft when firing gas. However, this ratio will not necessarily be the same as that used when firing fuel oil. The forced draft is controlled from the furnace draft.

Note in the control system diagram that a selector switch preceding the induced draft selector valve provides the means of controlling the induced draft in accordance with the type of fuel being burned. In the case of both the forced and induced draft fans, means are provided for controlling either fan speed or damper position automatically through the use of selector switches. Fan speed control reduces steam consumption of the fan turbines as dampers are then wide open, reducing the pressure drop. Damper position control provides a steadier control at low load operation and for startups or shutdowns, as well as providing a certain degree of spare control should the speed control equipment require servicing.

Remote manual control of either speed or damper—whichever is not on automatic control—can be obtained through the use of the remote manual relays. All controls

may be operated by manual-automatic selector valves. These selector valves also permit adjustment of the control point while in automatic operation.

Air for the operation of all pneumatic instruments is supplied by a horizontal 7 in. by 5 in. reciprocating compressor with a capacity of 75 cfm at 50 psi. The drive for the compressor is a 15 hp, 440 volt motor. After being compressed, the air is first passed through an aftercooler, accumulator and an air dryer before being distributed to the instruments. The air dryer has a capacity of 150 cfm and uses silica gel as a drying medium. Regeneration is automatic and operates on a four-hour cycle.

Pressure control on the instrument air system is automatic. High pressure (120 psi) plant air, with an automatic pressure reducing valve, provides a source of standby air for use when the instrument air compressor is being serviced or in the event of power failure.

All signals indicating abnormal operation are both visual and audible. The visual signal alarms are concentrated in an easily read block of lettered panels.

Also on automatic control is a high capacity 650 psi to 200 psi pressure reducing and desuperheating station. The purpose of this station is to meet demands for 200 psi process steam in the event that the flow from the exhaust of the 650 psi turbines is not sufficient.

Feedwater Treatment

Since it was necessary to operate this boiler plant on 100 per cent treated makeup, extensive water treating facilities were required. Experience at the other boiler plant had indicated that steam turbine fouling could be expected even though the total dissolved solids in the steam were 1 ppm or under. To avoid interruption of processing operations by water washing 650 psi steam turbines and keep the steam consumption of process turbines in general to a minimum, it was necessary to solve the problem of steam fouling. This was done by choosing the deionizing and silica removal process for feedwater treatment.

The untreated water is supplied by deep wells that discharge directly into the deionization plant. The chemical composition of the water is practically constant and

PRINCIPAL EQUIPMENT—Shell Oil Company, Houston Refinery, No. 2 Steam Generating Plant

BOILERS AND EQUIPMENT

Boilers ..... Two — Riley Stoker Corporation, 2 drum, outdoor, 650 psi, 750 F final steam temperature, gas fired. 250,000 lb/hr each. Steam drums 72 in. x 27 ft 3 in. x 3⅜ in. Mud drums 48 in. x 26 ft 9 in. x 2 11/32 in.

Superheaters ..... Riley high velocity type, 4800 sq ft heating surface.

Furnaces ..... Riley water wall, 7,530 sq ft heating surface. 22 ft 9 in. wide, 19 ft 11 in. deep, 29 ft 6 in. high. Volume—12,700 cu ft.

Air Heater ..... Riley, vertical tubular, single pass crossflow. 25,000 sq ft heating surface; 80 F inlet, 450 F outlet.

Water Columns ..... Two per boiler; water gage with 12½ in. vertical visibility.

Speed Controls, FD and ID Fans Four — Combination mechanical-pneumatic.

Forced Draft Fans and Drives Two—375,000 lb/hr air; driven by 273 hp gear connected steam turbines.

Induced Draft Fans ..... Two—400,000 lb/hr flue gas; driven by 276 hp gear connected steam turbines.

Feedwater Control Valves ..... Two—Diaphragm actuated, air operated.

Fuel Gas Header Pressure Control Valve ..... Two—Diaphragm actuated, air operated.

Pressure Reducing Station Control Valve ..... 650 to 200 psi, 500,000 lb/hr capacity, diaphragm actuated, air operated.

Water to Desuperheater Control Valve ..... One—diaphragm actuated air operated.

Desuperheater ..... 500,000 lb/hr capacity, Venturi type.

Desuperheater Steam-Tem. Controller ..... Pneumatic transmitter type.

Blow-off Valves ..... Two mud drum and three water wall per boiler, 1½ in. unit-tandem type.

Boiler Blow-off Tank ..... One—vertical 10 ft 6 in. x 72 in.

FUEL SYSTEM

Burners ..... Four per boiler. Combination gas and oil. Oil is steam atomized.

Combustion Control ..... Bailey pneumatic.

Fuel Oil Pumps ..... Two—Centrifugal, 200 gpm, 408 ft TDH pumps driven by 40 hp steam turbines.

Fuel Oil Storage ..... One—25 ft diameter, 30 ft high, closed storage tank equipped with automatic indicating level gage.

Fuel Oil Pressure Control and Control Valve ..... Two—Controlling steam to fuel oil pumps. Diaphragm actuated, air operated.

Fuel Oil Flow Control Valves .. Two—Diaphragm, actuated, air operated.

BOILER FEEDWATER EQUIPMENT

Feedwater Pumps ..... Three—4 stage, horizontal centrifugal pumps. 638 gpm, 1875 TDH. Two steam turbine driven, 450 hp. One motor driven 2300 volt, 450 hp.

Deaerating Feedwater Heater 695,000 lb/hr capacity, 15 psi, spray type with scrubber section and internal vent condenser. Permutit Company.

Deionizing Water Treating Plant ..... Permutit Company—1600 gpm capacity, 8 ion exchange units with regenerant measuring and dilution tanks and degasifier.

Deaerating Heater — Feed Pumps ..... Three—800 gpm, 150 ft TDH, bronze case and impellers. Two steam turbine driven by 45 hp type R3R turbines. One motor driven by a 40 hp 440 volt motor.

Anion Exchanger—Feed Pumps Two—2000 gpm, 144 ft TDH, Durimet 20 case and impeller. One steam turbine driven by a 95 hp turbine. One motor driven by a 100 hp, 2300 volt motor.

Chemical Transfer Pumps .... Two—50 per cent caustic pumps, 20 gpm 35 ft TDH. Driven by 1 hp 440 volt motors. Two 93 per cent sulfuric acid pumps, 10 gpm, 35 ft TDH, driven by 2 hp, 440 volt motors.

Chemical Injection Pumps .. Three—Sodium sulfite and phosphate injection with a common spare. 1.2 gph capacity.

Treated Water Storage Tank .. One—420,000 gallon capacity, vertical steel covered tank.

Treated Water Conductivity Recorder ..... 4-point strip chart recorder. Operates from four conductivity cells.

MISCELLANEOUS EQUIPMENT

Water and Steam Flow Meters Thirteen—Pneumatic transmitter type (d/p cell) integrating and recording

Pressure Gages ..... Pneumatic transmitter type.

Electric Substation ..... One—2300/440 volt, 300 kva transformer; 2300 volt switch gear; and 440 volt switch gear.

Sump Pump ..... One—120 gpm, 50 ft TDH vertical; driven by 3 hp, 1800 rpm 440 volt motor.

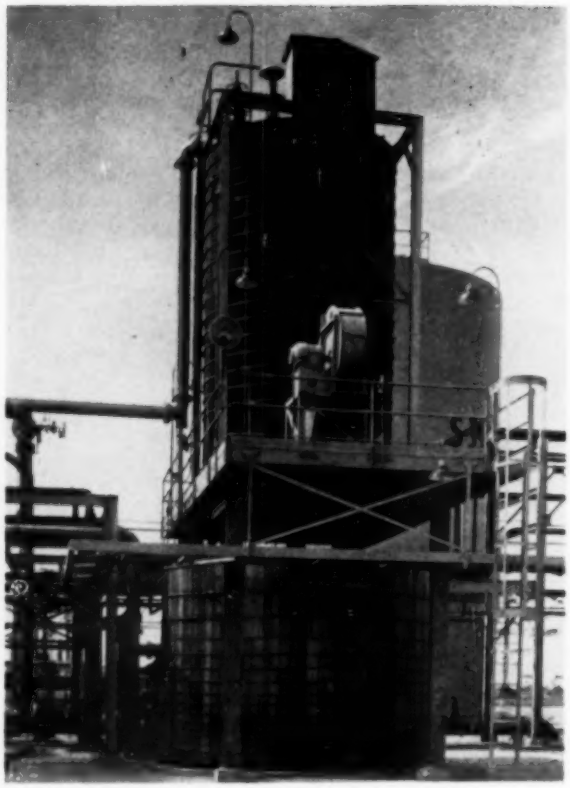
Design Water Analyses For Treating Plant

	Expressed as ppm	Water Analysis Raw	Treated
Total Hardness	$CaCO_3$	70	0-2
Calcium	$CaCO_3$	53	0-1
Magnesium	$CaCO_3$	17	0-1
Sodium	$CaCO_3$	241	2-3
Chlorides	$CaCO_3$	61	0-1
Sulfates	$CaCO_3$	20	0-1
Bicarbonates	$CaCO_3$	230	2-3
Silica	SiO_2	15	0.2

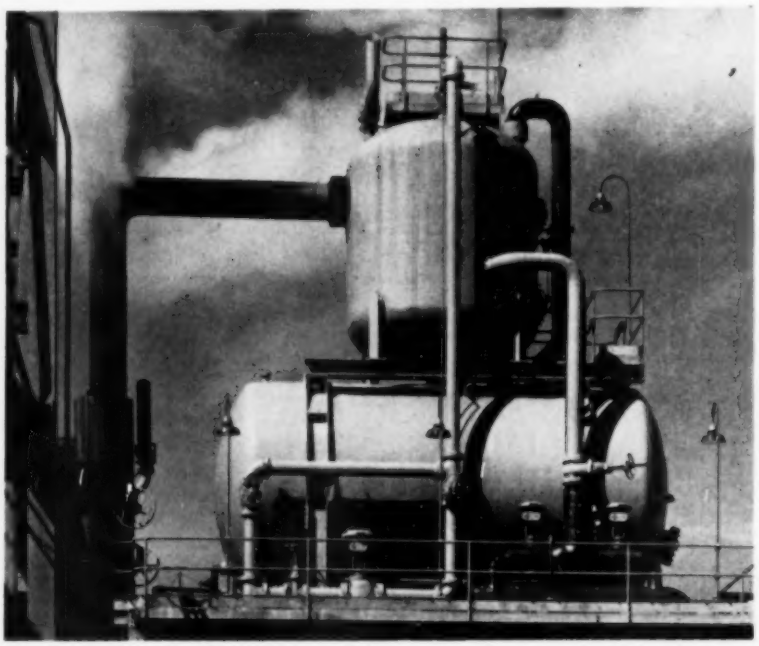
in general may be classified as high bicarbonate alkalinity, low hardness, high total dissolved solids and fairly high silica.

The first stage in the treating process consists of cation removal in a bank of four rubber lined, 10 ft diameter, 15 ft straight height exchangers, which operate in parallel. Each has a total treating capacity of 278,000 gallons and uses Zeo-Karb, a sulfonated coal, for the ion exchange media. In this stage of treatment, all cations are removed and hydrogen ions released in exchange. This produces an effluent high in carbonic acid, and also containing hydrochloric and sulfuric acids. This effluent is then passed over a degasifying tower which is constructed of redwood. Air, blown counter flow to the water, removes the greater portion of the carbonic acidity by driving off carbon dioxide. The water from the degasifier is collected in a 12,000 gallon wood storage tank and then pumped to the anion exchangers. These units, four in number, are 10 ft diameter, 8 ft straight height, rubber lined exchangers of 400,000 gallon treating capacity per unit. They contain Permutit "S", a synthetic resin, as an ion exchange media. In this stage of treatment all anions and silica are removed. Substitution of hydroxyl ions for the anions produces an effluent of low total dissolved solids and slightly alkaline in nature. This effluent flows to a 420,000 gallon storage tank.

From this tank the treated water is pumped to a 600,000 lb/hr capacity Permutit deaerating feedwater heater of the spray type, equipped with an internal vent condenser and steam scrubber section. The heater operates at 15 psi on steam supplied from the turbine exhaust of boiler plant auxiliaries and



This redwood degasifying tower is used to remove carbon dioxide from the water leaving the cation exchangers.



The Permutit Company deaerating feedwater heater is the spray type with scrubber section and internal vent condenser. 695,000 lb/hr capacity unit is mounted on a horizontal storage tank.

from the exhaust of turbines in processing plants.

All partially treated and treated water piping ahead of the deaerating feedwater heater is internally coated to provide protection against corrosion or water contamination. The acid effluent of the cation exchangers is passed through rubber lined pipe and pumped by pumps constructed of a corrosion resistant alloy. The interconnecting piping from the anion exchangers, storage tank, deaerator charge pumps and to the deaerating heater is lined with a baked phenolic resin. The storage tank itself is internally coated with a hot applied bitumastic coating, while the deaerator charge pumps are constructed of bronze.

As an additional precaution against scale and corrosion, phosphate and sodium sulfite are injected into the treated water following deaeration. Small mixing tanks and three chemical injection pumps are used for this purpose.

Since each exchanger has a treating capacity of a fixed number of gallons, before requiring regeneration, metering of the water constitutes an important control. Pneumatic transmitter type meters which both record and integrate flow supply this control. The integrator on each meter operates a totalizing counter which in turn sounds an alarm when sufficient water has passed through an ion exchanger to exhaust its treating capacity. A four-point conductivity recorder provides a continuous check on the quality of the effluent of each anion exchanger.

All signals and measured pressures or flows are either electrically or pneumatically transmitted to a panel in an air conditioned control building. This building also contains the laboratory equipment required for performing such tests as are necessary to control the feedwater and boiler water treatment.

The chemicals used for regeneration of the ion exchangers are dilute sulfuric acid and dilute sodium hydroxide for the cation and anion exchangers respectively. These chemicals are received and stored as 50 per cent sodium hydroxide and 93 per cent sulfuric acid. The amounts required for a regeneration are prepared in mixing and dilution tanks.

Regeneration of an ion exchanger is a semi-automatic process, controlled by a motor operated multiport valve. When a unit requires regeneration as determined by a meter actuated alarm signal, or by chemical test, regeneration is initiated from the control room by pressing a switch that starts the multiport valve on the desired unit. The regeneration then goes through a complete cycle automatically and returns the unit to service. A regeneration cycle consists of backwash, regeneration (during which period the regenerant chemical is hydraulically inducted into the exchanger) and rinse. The rate of flow of water from the unit to waste during backwash and rinse is controlled by float actuated butterfly valves so adjusted as to hold a fixed head of water over an orifice board type weir. The multiport valves have pilot connections which hydraulically actuate diaphragm valves to determine which exchanger receives the regenerant chemical.

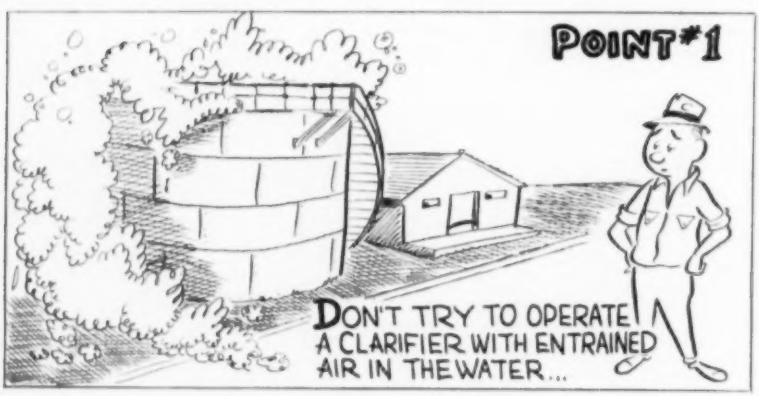
Ion exchangers are arranged in two banks of four each. Regeneration of an ion exchanger is a semi-automatic process, controlled by a motor operated multiport valve.

How NOT to Operate a Water Clarifier

By V. R. CHADBOURNE, Power Engineer, Magnolia Petroleum Company, Beaumont, Texas

THERE are plenty of bright boys who can tell you how to operate a clarifier and there are numerous published instructions to supplement their say so. Now this is a sort of negative approach to the same subject, only it proposes to tell you how not to operate a clarifier.

It might be said in the beginning that the system which is referred to in this so-called instruction sheet has no reservoir and takes its water as delivered by the seller direct from the pipe lines. Whenever the condition of the purchased water is varying, you may be sure that the clarifier is following suit.



Point 1—Entrained Air

SHORTLY after putting a new clarifier in service, we discovered to our amazement that while a wonderful floc was being formed it wasn't where the instruction book said that it should be. Ours was a beautiful golden one on the surface of the water. Some of the more facetious plant operators insisted that we had built the clarifier upside down.

It took considerable head scratching, deep thinking and scads of conversation before any theory of the probable cause of this upset was formalized. After numerous long distance telephone conversations with the manufacturer's representative, it was decided that air bubbles in the water were the cause of the migration of the floc.

There were many plans for its elimination, all costing considerably. Then, one of us came up with the brilliant idea that, if the source of the air entering the water could be found, maybe we wouldn't need to spend much money.

One of the sources of our fresh water supply is a municipality which pumps to us through a five-mile line. The pressure in this line where it enters our plant is low and variable. Booster pumps are employed to give the proper distribution pressure. At times the suction pressure on these pumps is at a slight vacuum. We found that whenever this condition occurred, air entered through the packing glands of the pumps. A further investigation showed that these pumps were once equipped with lantern glands but that some machinist, finding them rather difficult to properly pack, had discarded them. Our faces were a little red when this was brought to light, but restoration of the lantern glands with the proper water leakage corrected the trouble.

Don't try to operate a clarifier with entrained air in the water.

Point 2—pH Varying

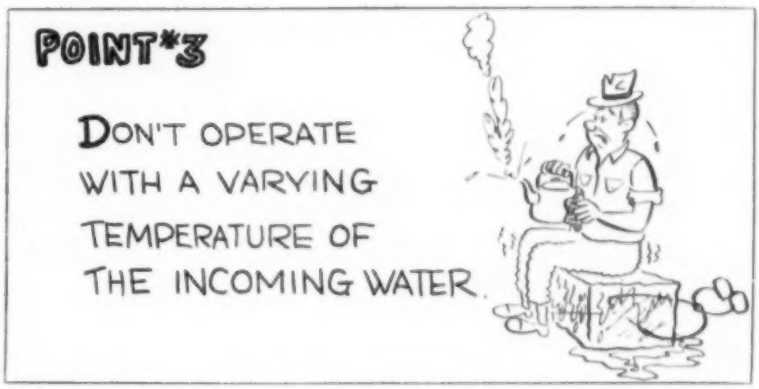
OUR contract with the municipality called for intermittent chlorination, the treatment being made necessary by the iron bacteria that readily grows in the line. The boys at the city pumping plant religiously lived up to their obligations and slugged in the chlorine every four hours. Now our water clarifies best at about a pH of 5.4, but within an hour after one of their treatments it dropped sharply to 4.9 and our turbidity rose to the point where our water looked rather soupy. We had to change our contract to continuous chlorination before that problem was solved.

Don't operate with the pH of the incoming water varying sharply.

Point 3—Temperature

We recover sizable amounts of condensate from various units (our plant is a large oil refinery) and practically all condensate is passed, after oil removal filters, to the heaters. However, there is a considerable amount of clean condensate from a trick surface condenser where it is mixed with raw water that must be clarified. This mixture is, of course, of higher temperature than the other raw water. Sudden changes in the quantity of this water due to power load changes make an appreciable change in the temperature of the entering water. This change of temperature gives the clarifier a belly ache and starts its blanket to boil upwards, with resulting changes in the turbidity of the effluent. Holding the power load constant on the unit where the condensate originates has proved the answer.

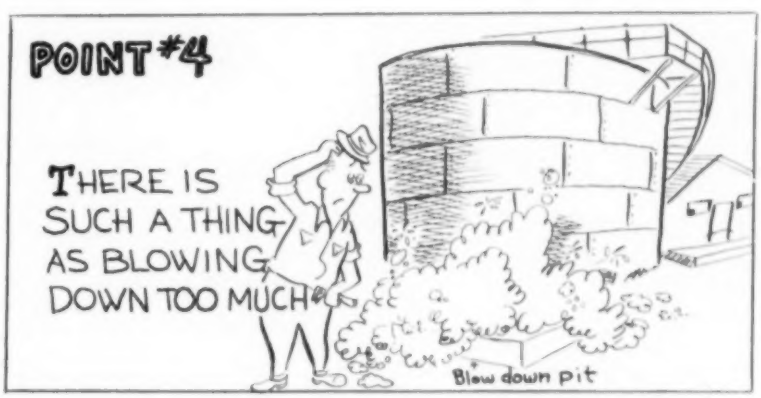
Don't operate with a varying temperature of the incoming water.



Point 4—Blow Down

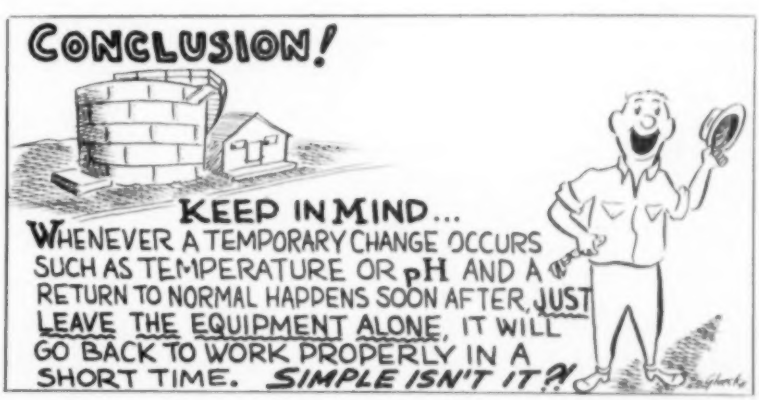
On this particular clarifier the blowdown is initiated by a photoelectric cell. The floc formed in our water is very light. We found that sometimes when the blowoff functioned, the floc, instead of settling, really expanded so that the blowdown mechanism continued to operate with the result that the sludge blanket was destroyed. By introducing an interrupting relay in the circuit, compelling the blowoff valves to close after a certain number of minutes, this difficulty was overcome.

There is such a thing as blowing down too much.



Conclusions

But what might be really pleasing to anyone operating such equipment is the fact that whenever a temporary change occurs, such as temperature or pH, and a return to normal happens soon after, just leave the equipment alone. It will go back to work properly in a short time.


CONCLUSION!
KEEP IN MIND...
WHENEVER A TEMPORARY CHANGE OCCURS SUCH AS TEMPERATURE OR pH AND A RETURN TO NORMAL HAPPENS SOON AFTER, JUST LEAVE THE EQUIPMENT ALONE, IT WILL GO BACK TO WORK PROPERLY IN A SHORT TIME. SIMPLE ISN'T IT?!

ENGINEERING MATERIALS

Highlight Report on the Basic Materials Conference

By DR. ROBERT J. RAUDEBAUGH Acting Director

School of Chemical Engineering, Georgia Institute of Technology, Atlanta, Georgia

The 1st Basic Materials Conference was held concurrent with The Exposition of Basic Materials For Industry in New York City, June 16-18, 1953.

APPROXIMATELY 400 registrants gathered for the Basic Materials Conference at the Hotel Roosevelt to hear invited papers on various aspects of the engineering materials problems and to discuss pertinent matters with panels of experts. The program, directed to users of engineering materials, was held to a fairly introductory level.

Over 6200 persons had registered by mid-afternoon of the fourth day, for the exposition at Grand Central Palace. Approximately 85 exhibitors participated in the show, and with but few exceptions displayed basic engineering materials. The exposition illustrated many of the items stressed in the conference.

Material Economy

The growth of gross national products in the United States is increasing at a rate of 3% per year —that is, it will double in 25 years.

As a result of improvements in technology, the materials demand does not rise this rapidly. Nevertheless, real costs are increasing—more effort is needed to acquire every pound of material (products).

Development of new materials is motivated by the need for conservation of strategic materials, and the need to satisfy service conditions beyond the capabilities of existing materials (elevated temperature and atomic energy applications, for example).

New material development has not lessened the overall demand for the older engineering materials—plastics production has grown to exceed the total nonferrous metal production, while the latter continue to be in increasing demand.

Service Requirements

Considerable time was devoted to advances made in specific materials for particular service requirements such as high strength-weight ratio, low-temperature shock resistance, high-temperature oxidation and creep resistance, low neutron cross section (for atomic energy applications), good electrical insulating qualities under a variety of conditions, and ferromagnetic properties. Among the materials considered were the following:

Titanium—Never before has so much been learned of a metal in so short a time. Strength-weight and fatigue-tensile strength ratios are particularly favorable. Production is on the increase and the price may be expected to drop. Alloys are well suited to the temperature range of 800-900 F. Considerable effort is being expended to develop alloys with improved welding characteristics.

Sintered Aluminum Powder (SAP)—This is a most interesting and promising Swiss development, with parallel studies being undertaken by Alcoa, and others, in this country.

SAP, comprised of metal powder (2S, for example, in flake form) and 10-20% aluminum oxide, is consolidated by powder metallurgy techniques and ultimately forged, rolled, or extruded to shape. Finished stock may exhibit up to 50,000 psi tensile strength, 10% elongation, and good creep resistance to 600 F.

Ultra High-Strength Steels—Steels of the 4340 type, heat treated utilizing a low tempering temperature, develop up to 280,000 psi tensile strength with 10% elongation. These steels are highly notch sensitive.

Chromium Alloys—New structural alloys, practical for use in the vicinity of 1600 F may be of this type. Forgeable alloys have been made, but their room temperature ductility leaves much to be desired. Fortunately, the scarce elements, cobalt and columbium, common to many of the super stainless steel alloys are not ingredients of the experimental chromium-base materials.

Molybdenum Alloys — The elevated-temperature strength characteristics of these materials are such

(*Continued on page* 108)

OXY-ACETYLENE FLAMES

Versatile Maintenance Tool at Union Bag and Paper—Savannah

Dorsey B. Thomas

By DORSEY B. THOMAS, Welding Instructor
Union Bag and Paper Corporation, Savannah, Georgia

Reclaiming material, hard surfacing, and rebuilding production equipment are time and money saving uses reported by Union Bag plant maintenance personnel.

Mr. Thomas has had considerable experience in the welding and general industrial fields, including 7 years with the Savannah Machine & Foundry Co. and the past 8 years with Union Bag & Paper Corporation. His technical book "Pipe Welding Layout" is used as a fabricating standard and training media at the Union Bag Savannah plant.

MAINTENANCE in paper mills, as in all other large manufacturing plants, plays a very important part in production. Without an efficient maintenance program no manufacturer can produce top quality products at competitive prices and continue to progress.

Union Bag and Paper Corporation—Savannah

THE Savannah, Georgia plant of Union Bag and Paper Corporation is the largest integrated pulp, paper and kraft container operation in the world. Started in 1936 with one paper machine and a small bag factory, it now has five 236 in. paper machines with the necessary pulp making equipment, a paper processing department, a by-products plant, a large bag factory and a corrugated box plant. The bag factory produces enough bags every four days to provide one bag for each of the 150 million people in the United States.

A sixth paper machine of the same size is now being installed along with the necessary pulp facilities for this addition. This expansion will be completed by the fall of this year. The anticipated production with this addition will be in excess of 1,800 tons of finished paper and paper board daily.

Lost time in our productive machinery is very expensive. For example, the production loss on a paper machine out of operation will range from $1,000 to $1,800 per hour.

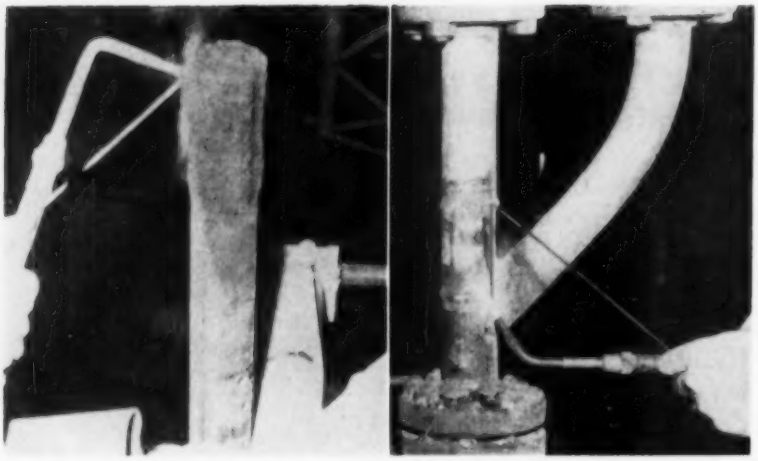
It is the responsibility of the maintenance department to keep the plant in good operating condition, making all repairs and replacements on pipe, tanks, machinery, pressure vessels and structural steel. The department also does a considerable amount of new construction.

Oxy-acetylene equipment is found in most maintenance departments. We have grown so accustomed to its presence in our shops that we sometimes overlook its value to us. However, I would hate to think of our plant trying to compete with other manufacturers without the use of this equipment.

The purpose of this discussion is to illustrate to you some of the uses we have found for oxy-acetylene in such maintenance work as reclaiming material, hard surfacing, and rebuilding production equipment.

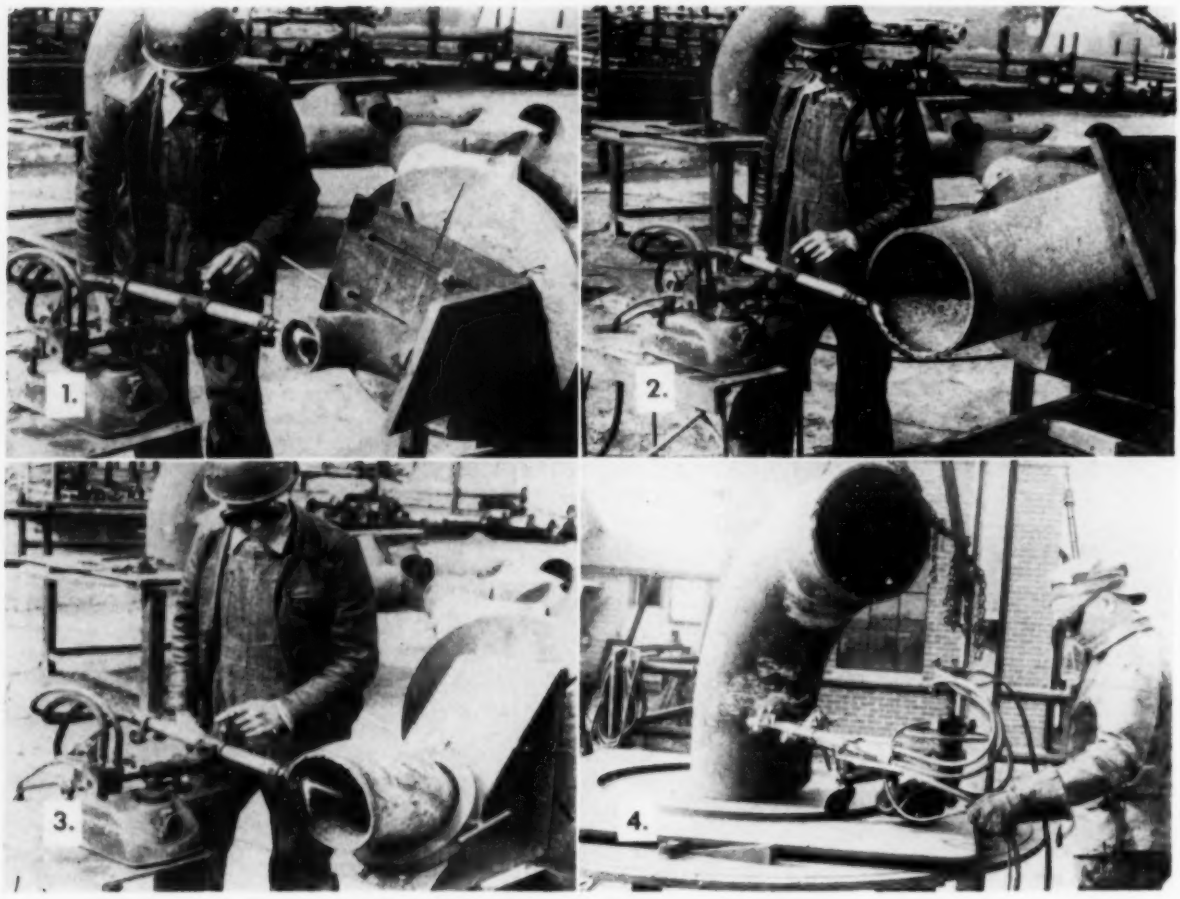
Our maintenance department began its activities in 1936 with two oxy-acetylene hand torches. There are now 90 hand torches in operation in various departments throughout the mill. This represents over a period of 17 years a total increase of 4,400 per cent. In addition, we have special equipment for powder-cutting, flame-hardening, flame-priming and metalizing; also ten portable cutting machines and one 3 by 10 ft shape cutting machine. Last year 1,800,000 cu

Adapted from comments by Dorsey B. Thomas at the 1953 Annual Meeting, International Acetylene Association in Atlanta, Georgia.



This 3 in. stainless steel agitator shaft 13 ft long (left) is used in a dissolving tank for mixing fused salt cake or sodium sulfate with weak liquor. High temperature and corrosive reactions of the chemicals in this operation made it almost impossible to find a suitable material for these shafts. Shaft life has been increased from 3 months to 12 months simply by hard surfacing the bearing journals with a cobalt base alloy.

At the right a 2 in. stainless steel pipe is being welded by the oxy-acetylene method. A considerable amount of stainless steel pipe is used in the Union Bag and Paper Corporation plant due to the extreme corrosive conditions. The oxy-acetylene method is used for welding all small sizes of this pipe.



Typical Material Reclamation Techniques at Union Bag

Here's how the reclamation of used tube turns has been accomplished with the use of a simple jig, a welding positioner and a cutting machine.

The tube turn mounted in the jig (1) is 4 in. in diameter. Jig is adjusted to rotate the end of the tube turn being cut in a true radius at a desirable speed for good cutting. Even sizes this small can be salvaged at substantial savings. One mechanic and a helper can square both ends of 62 tube turns this size in eight hours, making perfect 90 deg. ells that can be reused in most installations as new fittings.

Photograph 2 shows a 12 in. tube turn mounted in the jig. In eight hours, 35 of this size can be reclaimed. This jig handles sizes ranging from 4 to 14 in., making true 90 deg. turns. Photograph 3 shows a jig for cutting true 45 deg. turns ranging from 4 to 14 in. in diameter.

An 18 in. stainless steel tube turn is being reclaimed in photograph 4. The powder-cutting attachment being used makes it possible to reclaim all types of stainless, monel, and nickel fittings. The original cost of the stainless steel tube turn shown was $1,500.

Close-up of some of the welds and rivets in a barking drum. Approximately 3,500 ft of 1¼-in. weld and 24 1⅛-in. rivets are used in rebuilding each of Union Bag and Paper Corporation's six barking drums.

In the rebuilding operation, the welds and rivets are removed by the use of hand torches equipped with large size wash and rivet cutting tips. Approximately 12,500 cu ft of oxygen and 6,000 cu ft of acetylene are consumed in rebuilding each of these drums.

ft of oxygen and 500,000 cu ft of acetylene were consumed.

In our extensive maintenance operations numerous problems are encountered, some of which have been eliminated with the aid of oxy-acetylene equipment.

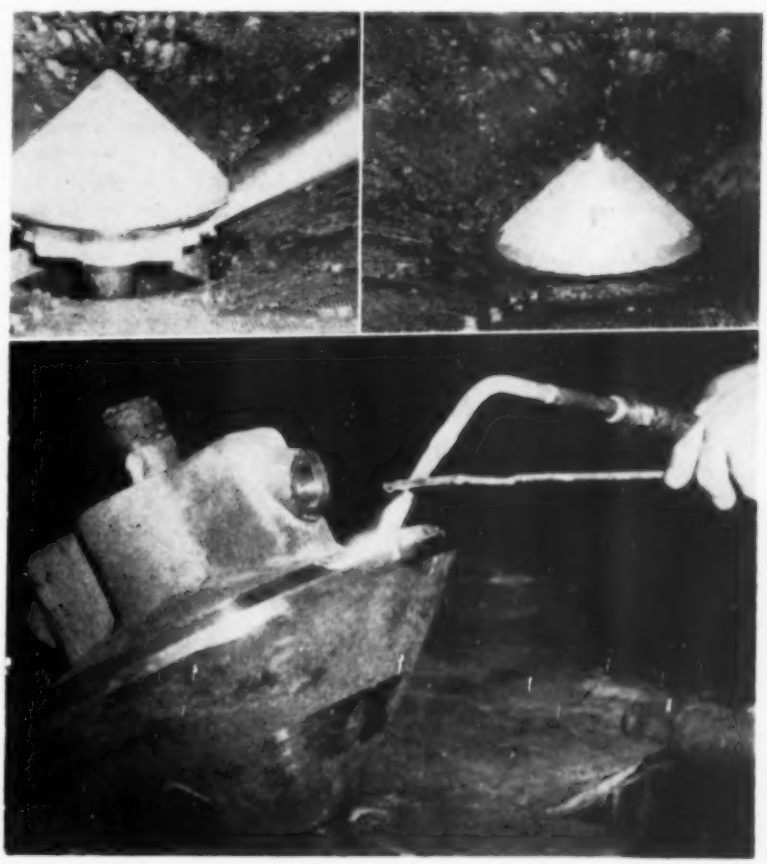
Reclamation

An average of 410 tons of pipe and pipe fittings is used annually for replacement and necessary alterations in the piping systems. Of this amount, about 20 per cent can be reused if methods of salvaging are profitable.

Photographs show how the reclamation of used tube turns has been accomplished with the use of a simple jig, a welding positioner and a cutting machine.

There were 950 tube turns of all sizes salvaged in 1952. After the cutting operation these fittings were cleaned in acid and dipped in a rust preventive solution. They were then returned to the mill stores, to be used later in most installations as new tube turns. The original cost of the tube turns was $18,500. The complete salvage operation cost less than $3,000. This left a net saving of more than $15,000 on this salvage operation.

(Continued on page 88)



This automatic dumping valve is used to wash pulp out of a tank 13 ft in diameter and 30 ft high. Valve is of foreign design and construction, and replacement parts are not readily available.

Valve is shown in open position (above, left) spraying two streams of water under high pressure. Water loosens the pulp as the head rotates and the pulp flows out through the opening around the shaft. Head and seat of valve are made of cast stainless steel.

Valve (above, right) is in closed position. Head would close while turning, causing a galling or fretting action, which occurs from the two similar metals rubbing together. These parts had a life span in some instances of only 30 days. Repair cost of removing, machining and reinstalling this valve was over $500.

In the lower view one of these valve heads is being resurfaced by the oxy-acetylene method. As an experiment one valve head was refaced with a nickel base alloy. This head was placed in service in July, 1952 and is still operating perfectly. Since that time 11 more valves have been resurfaced. Operation has eliminated all lost time that was previously caused by the galling action on these valves.

If we really want to fight for our American Way of Life—

It's Not Too Late!

By CAPTAIN EDDIE RICKENBACKER
President and General Manager
Eastern Air Lines, Inc.

THERE is no need for me to underline the grimness of the times, even in the face of our national prosperity, for we have been and we remain, spectators, observing some of the most disturbing chapters in global and domestic history in the making.

In a global sense the divided world shows no signs of becoming less divided. And the "cold war" with Communism has brought serious dislocations in the lives of nations of free men.

From a domestic viewpoint, our enormous gains in science, in techniques and in productive experience, have resulted from more than a century and a half of American freedom for which we should be thankful to God. Science, machinery and laboratory skills are ready to go still farther, ready to exceed now even our fantastic modern dreams.

But in this atmosphere of apparent prosperity I feel compelled to sound a note of concern about some other matters that are more important to us and our country than material gains.

Are We Forgetting Spiritual Values?

Something has been wrong—something is still wrong—with America!

One thing that has been wrong with America was righted, at least for the time being, last November. Before that, for more than a decade, our priceless electoral prerogative had been shamefully neglected.

In 1940, some 62 per cent of the eligibles voted for a president; in 1944 the percentage was 57 and in 1948 it sank to 52.

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What happened last November gave great satisfaction to those of us who had despaired of the average American's concern with affairs of state. Electors by the unexpected millions burst from their often and loudly criticized complacency to demonstrate that their stupor was only a chronic condition—not so acute that it could not be cured by generation of some good, old-fashioned American indignation.

Nevertheless, this great land of ours—this America that I love better than life itself—is traveling down the wrong highway. In the midst of prosperity we are forgetting the spiritual values, and the moral courage passed on to us by our forefathers who founded this nation.

I think I can speak with some authority on the subject.

For where is there another land in the world where a young man can come from the wrong side of the tracks, as I have, and graduate into a relative position of leadership and affluence because of the very freedoms, liberties, and opportunities this land offers? Where is there another land? There is none.

I am a first generation American, whose parents 75 years ago migrated from Switzerland. They came to America to take advantage of the opportunities that existed here—came here to enjoy the freedoms, liberties and laws of this land.

My immigrant parents taught me and six other members of our family to enjoy and appreciate the freedoms of this country. They taught us how to work. They taught us that we could never expect something for nothing, nor more for less. They taught us to be frugal. They taught us, above all, to love America!

We are fortunate and grateful heirs of the Pilgrims, the Puritans and the Cavaliers, who came to America almost 300 years previously. Through indescribable hardships they carved out a new nation founded upon

Military strength, alone, will not save this nation from the perils which surround it, says Captain Rickenbacker. Dollars and bullets are not enough. We must return to the principles on which our nation was established. We must revive the Spirit of America if we are to retain our precious heritage for future generations.

CAPTAIN RICKENBACKER'S life has been filled with adventurous activities and great achievements. In his early 20's he attained nation-wide fame in automobile racing. In World War I he was America's Ace of Aces, winding up as Commander of the 94th Aero Squadron, being credited with 26 victories, and receiving the highest American and French military awards. Following some years in high executive positions in the automobile industry, he entered the aviation field in 1929, became general manager of Eastern Air Lines in 1935 and president and general manager in 1938. During World War II his activities included several special missions for the Secretary of War to European and Asiatic countries, the South Pacific and the Aleutians. It was on a flight across the Pacific in 1942 that he was forced down at sea and finally was rescued after three weeks on a life raft.

belief that all mankind is born to be free—physically, mentally and spiritually free, as a matter of right from the Creator and not as a mere privilege granted by the State.

Further, it lies within the power of each human being in the system of free enterprise to succeed or fail according to his own character and efforts. I am the beneficiary of those who in the meantime have worked and fought to defend and develop this country and its institutions for future generations—and to all of them I make my grateful acknowledgments.

Few men, if any, have cheated death as often as I have in the past forty-five years. And it wasn't because of any super-knowledge or super-ability on my part, but because of my great faith in the Power above, and the desire to contribute something to this land of mine and to its people for what our country and they have given me.

But faith is not alone for the individual. If one man needs it, how much more does a nation need it? We are becoming weak today because, instead of following the enduring spiritual principles upon which our nation was founded, we have substituted material wealth as the yardstick with which to measure success.

As individuals, we have been selfish and preoccupied with material ambitions. We have felt that we needed more and more of the material things of life, and have forgotten the need of more and more of the spiritual side of life—of simple Christianity.

Nothing Can Equal Christianity

There is no greater weapon in the world than the moral force that goes with the strength and spirit of Christianity. I reiterate—there is nothing that can equal Christianity. And when I say Christianity, that includes the Jewish faith or any other faith—as I am talking about faith itself—faith in a Supreme Being.

The most important thing that has happened since the birth of Christ is the birth of America. The second never could have happened without the first. The Colossus that we call America has been the product of the idea of the sovereignty of the individual that Christ brought to the world.

Our Founding Fathers believed in the Ten Commandments and the Golden Rule. Within that moral code they had a complete way of life—in matters spiritual, political, social and economic.

It was obvious that to sabotage America's faith in America it was necessary to transfer the people's faith in God to Faith in the State. Morality in politics, business and private contracts had to be broken down. The strategy has been to undermine the foundations on which that morality rested and, in the chaos that followed, offer the Total State as the only alternative to continued chaos.

Thanks to our science and industry, we are not short of weapons, but weapons are no substitute for the will

It's Not Too Late!—Rickenbacker

(*continued from preceding page*)

to fight and the courage to die should an emergency arise. Our military strength does not seem to frighten our enemies, and the reason may be that there is so little moral strength—so little singleness of purpose—behind it.

We must not make the mistake of thinking that the outcome of the struggle between Communism and freedom will be determined by military and economic power alone.

In this period of moral laxity, many people believe that the task of bringing America back to the Golden Rule and the Ten Commandments will be a most difficult one. But the wages of economic sin can be measured in dollars and cents, and I am convinced that business morality can be sold just as surely as soft drinks and radio sets can be. The connection between a nation's morals and its material welfare is simple and certain.

What Can We Do?

We must revive and instill the spirit of America. America is the spirit of man, the spirit that is in your heart and mine, and that spirit must be expanded. It must be re-kindled, not only in ourselves of our generation, but further, it must be implanted in the younger generation, or America must go the way other lands and other peoples have gone.

Instead of our young people knowing and understanding the homely virtues of industry, and loyalty and self-reliance, their chief concern now seems to be to complacently lean on government subsistence and let taxpayers foot the bill. The trend is to turn our very lives over to the Government which is to feed and control us.

The growth of the activities of the Federal Government is revealed by the increase in the federal budget from some 3 billion dollars in 1936 to over 71 billion dollars in 1951, and over 85 billion dollars demanded by the President for 1952-1953.

The national debt has grown from one billion dollars at the start of World War I to $265,583,000,000 as announced last spring by George M. Humphrey, secretary of the treasury. This means a debt of nearly $7,000 for every family in the United States.

Our departures from the covenant of the Founding Fathers are startling. The most fearful event of these times is the colossal expansion of the national government and the constant increase of executive power within the government. The trek back to free enterprise, and the American Way, will not be easy.

For decades the income tax has furnished the government with more and more "easy money," which has led to the gradual growth at the national capital of functions that might better have been exercised by the states or even by local government.

The same process of centralization, though in less degree, has taken place in several states which have taken over functions that might better have been executed by local government. Barring rare examples, local government is, or can be made, more honest, efficient and responsive to public interest, than state or national government.

By every step we take toward making the Government caretaker of our lives, we move toward making it our master. Paternalistic government can gradually destroy, by the immediate advantages of subsidy, the will of the people to maintain a high degree of responsibility. This will cause the abdication of individual responsibility, which is inevitably followed by further concentration of power in the government—leading ultimately to absolute power over our lives and freedoms.

We have demonstrated that our system of free enterprise, run by free people, can out-produce by a wide margin any other economic system. The very core of what we mean by Americanism is individual liberty, founded on individual responsibility, equality before law, and a system of private enterprise that aims to reward according to merit.

Strange as it may seem, there are some in this country of greatest freedom, greatest happiness and greatest prosperity, who lend willing ears to the alien propaganda which says that we, the best fed, best clothed and best educated people in the history of the world, should discard our social, economic and political systems—our way of life—and adopt the totalitarian pattern.

I am not afraid that our people will directly and intentionally exchange our free, happy and prosperous society for the slavery of Russian totalitarianism, or repeal the Bill of Rights. But there is some danger that we may lose our freedom without knowing it—that totalitarianism may overtake us before we are aware of it.

Freedom is more than the Bill of Rights.

Freedom, if it is to have meaning, must continue to find expression in the everyday lives and affairs of the people. Freedom is more than a law, or an abstract idea—it is a living reality.

How can we lose it unintentionally?

Freedom begins to perish when it becomes inconvenient or difficult for one to exercise it. Freedom exists only in its being daily exercised and enjoyed.

Recent trends have been toward community responsibility for the individual welfare at the local, state and national levels. Over 30 per cent of all income is taken by government through taxation—and government (local, state and federal) in turn disburse subsidies, bounties, benefits and permits to the individuals.

More and more we are moving in the direction of production for a community storehouse upon which all of us are becoming dependent for our own sustenance and for the operation of our various enterprises. The distribution of the variety of benefits from the common storehouse necessarily is in the hands of persons who are employed by local, state or national agencies.

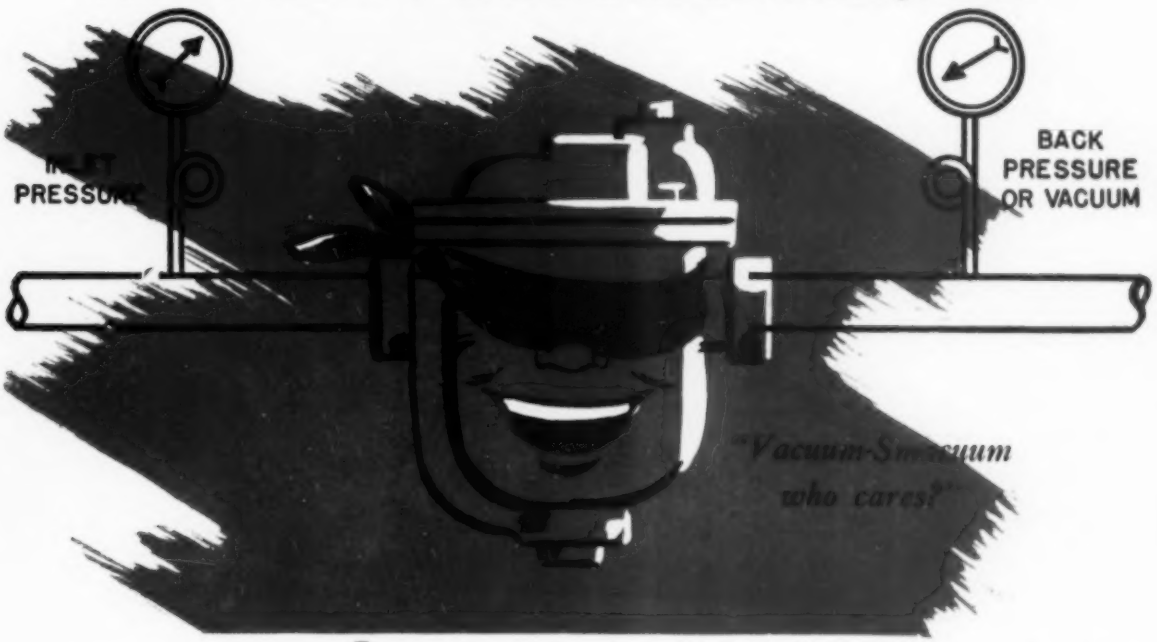
When Andrew Jackson became the champion of the rights of the masses 125 years ago, the "spoils" of

(*Continued on page* 116)

VACUUM ISN'T VACUUM

TO A STEAM TRAP

. . . It's Just Pressure Below Atmospheric



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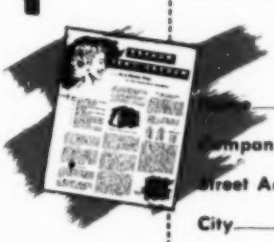

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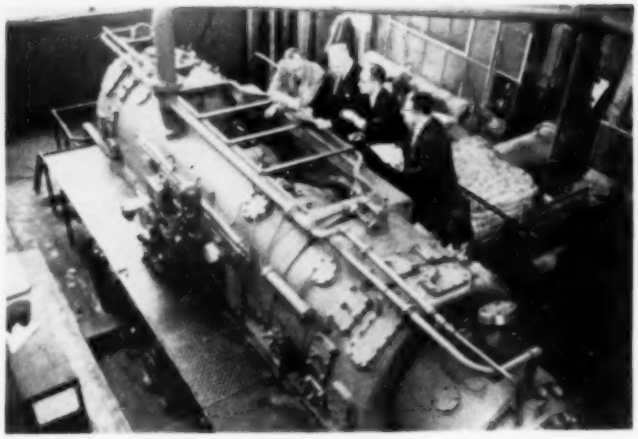
A practical heavy-duty gas turbine . . .

Free Piston Engine Combined With Gas Turbine



Cooper-Bessemer reports development work on combining free piston engine with gas turbine. Its engineers believe their design will provide the most practical heavy duty gas turbine. Seen with a unit on the test floor are left to right, R. L. Boyer, Chief Engineer; R. P. Ramsey, Project engineer; D. A. Klinger and W. A. Moraine of Cooper-Bessemer's Engineering Experimental Department.

SMALL, simple and compact, the free piston engine turbine requires less space than needed by other prime movers. It can be installed at much lower cost per horsepower, and costs less to maintain and supervise. High operating efficiency is one of the greatest advantages over conventional gas turbines. According to Cooper-Bessemer development engineers, efficiencies as high as 40% are possible with their unit, compared to commercial attainment of efficiencies in the 25% range for conventional gas turbines of today.

The gas turbine itself is, of course, nothing new in the power field. Gas turbines have been in use on jet aircraft for many years. Commercially over 49,000 horsepower is already installed or scheduled in this country's electric generating plants. Many thousands of horsepower are in other uses and in turbo-superchargers. In foreign countries the total exceeds 245,000 horsepower.

The basic difference between existing gas turbines and Cooper-Bessemer's development is in the method used to supply the turbine with heat energy.

In the conventional gas turbine, air for combustion is compressed by a rotary type blower. This blower or compressor is driven from the shaft of the gas turbine itself. After the air is compressed, the fuel is burned in a low pressure combustion chamber between the compressor and the turbine.

With the Cooper-Bessemer development, the free piston engine replaces both the rotary compressor and the low pressure combustors supplying hot gas under pressure to the gas turbine. The free piston engine furnishes its own high pressure efficient combustion chamber within the engine's power cylinder.

Free Piston Engine

The free piston engine is basically a simple opposed piston internal combustion engine without a crankshaft or connecting rods. The work of many pistons in the ordinary internal combustion engine is handled by just two pistons which directly oppose each other in a single cylinder.

Fuel is ignited in the space between the two power pistons. The burning gases force them apart to actuate compressor pistons directly attached to them. As the piston assemblies reciprocate, air pumped by the compressor pistons is directed through the combustion cylinder. The air cleans out or scavenges the combustion cylinder and forces the hot gases through a pipe to propel the blades of the turbine rotor.

The cycling of the air through the free piston engine's cylinder keeps the cylinder cool and lowers the temperature of the gases going to the turbine. The combustion taking place at high temperature and pressure in the water cooled cylinder permits the free piston engine turbine to operate with a high overall efficiency on exhaust gas discharged at 1000 F, after it has been expanded partially to compress its own air. This is in contrast to the high temperature required to gain relatively inefficient operation of most conventional gas turbines at around 1350 to 1500 F.

One great advantage of operating as low as 1000 F, explain Cooper-Bessemer engineers Ralph Boyer and Robert Ramsey, is that the

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DURASHEATH* is a light, tough cable. It is easily installed and thoroughly dependable for series or multiple street lighting, traffic control, and airport† lighting, residential primaries and secondaries as well as for industrial plants and railroads. It may also be used as Type USE cable for underground service entrance.

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turbine can be made of materials normally available for civilian use and that can be easily manufactured. The higher temperature alloys needed for other types of gas turbines probably will remain on priority lists for a long time, for jet engines and other aircraft or special usages.

How It Works

Combustion in the free piston engines takes place at very high pressures and temperatures and the full expansion work is taken out of the cycle. Combustion in a conventional turbine takes place at much lower pressures, but at very high temperatures and a great deal of the energy is wasted out the exhaust.

In a simple cycle gas turbine, producing, for instance, 5000 net horsepower at the output shaft, actually about 15,000 horsepower must be developed by the turbine's rotor. Approximately 10,000 hp has to be taken out of this 15,000 hp to drive its own compressor.

Many devices have been developed to boost efficiency of the conventional rotary compressor type of gas turbine. Some machines recover waste heat from the turbine exhaust to help heat the air going into combustors. The heat from the exhaust supplements fuel burned in the firing chamber through a regenerator. The free piston engine does not need a regenerator because it uses the exhaust energy in the turbine itself. When compound turbines are used to gain pressure and efficiency, it is necessary to use intercoolers between compressors, thus burdening the continuous combustion gas turbine with another expensive device. The free piston requires no intercooling.

The free piston engine requires no reheat procedure.

The principle of the free piston engine driving a gas turbine has been known to power engineers for a long time. The practical usage began in small compressor units developed in Europe during World War II in submarines for supplying high pressure air to discharge torpedoes. The Navy has long been interested in the cycle, but has not put forth the kind of effort found in aircraft development because of the lack of extreme urgency and the requirement to apply most of the talent towards the pressing matter of aircraft jets.

Alert to a need for more efficient turbine machinery, Cooper-Bessemer undertook as part of its overall developmental program a project to investigate the free piston engine. While the engineering time and cost have been very substantial, the company feels its long range planning is going to pay off in fulfilling needs in the power fields that the company serves.

The gas turbine has always been attractive to power users because of its promise as a compact simple unit. Cooper-Bessemer feels that now with the free piston engine, this objective can be reached. Free of vibration, the free piston engine needs but a fraction of the foundation size of conventional prime movers.

What's Ahead

From what is already known about the free piston engine turbine, Cooper-Bessemer feels their development will accelerate preference for gas turbines in central station operation as well as in general industrial power. While present plans call for power generating units having capacity from 5000 to 15,000 kw, in all probability larger sizes will be developed later.

Being a simple self-propelled prime mover, the free piston engine adapts itself to gas turbines of practically any size. A number of free piston engines can be grouped as gas generators driving a single gas turbine. One or more of these free piston engines can be added or cut out of a line for meeting varying load requirements.

While Cooper-Bessemer engineers view their new development with optimism, they caution that there is still much to be done in way of field testing before the units will be actually released for production.

Hat's Off to Old Hickory—

Du Pont's Tennessee Plant Sets World Safety Record

The Du Pont Company's Old Hickory rayon plant has set a matchless record in industrial safety. It became the world's safest industrial plant with a total of 28,160,000 man-hours without a lost-time injury and the employees are still adding to the total.

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The new achievement was marked by a ceremony for all employees at the plant with the accomplishment being officially recognized by the National Safety Council and personally applauded by Crawford H. Greenewalt, president of the Du Pont Company, and officials of the company's Textile Fibers Department.

F. Murray Acker, manager of the rayon plant, told the 3500 employees what their record meant in terms of real accident prevention. He said that during the period from June 26, 1949, when the present record started, to June 27, 1953—a period of 1463 days—the plant kept 306 major injuries from occurring.

"Our records show that 306 major injuries would have been caused," Mr. Acker said, "if this plant had made no improvement in the accident prevention program of the early years of operation."

Mr. Greenewalt, lauding the spectacular accomplishment of the men and women of Old Hickory, said:

"The principle of working safely is as old as the Du Pont Company. One hundred and fifty-one years ago the founder of the company designed his powder mill in small, widely separated units, just to make his operations safer.

"You men and women have demonstrated that it is possible to work without any lost-time injury whatever. You have been doing it for more than four years. If all the Du Pont Company could do likewise, if the chemical industry and all other industries could match your achievement, the saving in distress, in suffering, and even in death would be beyond price."

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LIGHTNING PROTECTION

Where Should Industrial Plants Take Preventive Measures?

By JAMES W. WARD
Electrical Engineering Department
Avondale Mills
Sylacauga, Alabama

INDUSTRIAL plants should begin their lightning protection immediately after the power company system ends. The last power company step in most cases is lightning arresters on the high voltage side of their substation. These arresters are tied to the substation ground.

We begin our protection between the substation and our main switchboard breaker with lightning arresters or lightning arresters in parallel with surge capacitors. All of our old indoor switchboards have lightning arresters connected to the incoming line as it starts through the mill wall. As we have replaced these old oil breaker switchboards with drawout air circuit breakers, we have included lightning arrester-capacitor combinations. We bought a three-phase thyrite lightning arrester and a three-phase capacitor separately for the first new switchboard, but have had them included in the specifications for five other switchboards.

A lightning arrester-capacitor is mounted in the rear of the incoming line panel of one of our outdoor switchboards (see Fig. 1). These are connected directly to the bus and to the switchboard ground bus. The switchboard is the outdoor type located adjacent to the substation, and in such instances we connect the switchboard ground bus to the power company substation ground.

The new indoor switchboards will have their lightning arresters and capacitors mounted similarly and connected the same as the

James W. Ward

Mr. Ward is a mechanical and electrical engineering graduate of Auburn and has been associated with the electrical engineering department of Avondale Mills since 1948, working with the application and installation of electrical equipment in the company's six Alabama plants. He is a registered Professional Engineer in the State of Alabama.

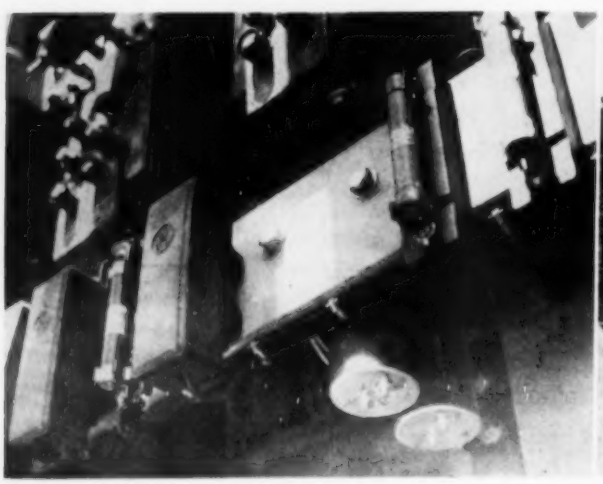


Fig. 1. Lightning arrester-capacitor mounted in rear of incoming line panel of outdoor switchboard.

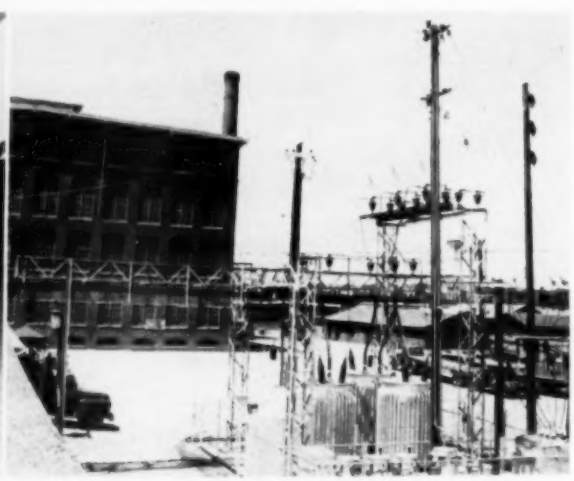
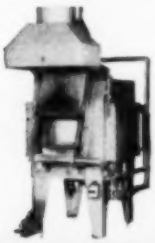


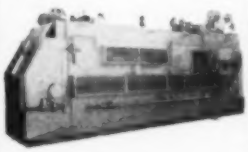
Fig. 2. Substation at one of Avondale's plants serves several lines. Note lightning arresters atop poles.

Conveyor brazing furnace

Batch tempering furnace



Controlled atmosphere hardening furnace (tool room)



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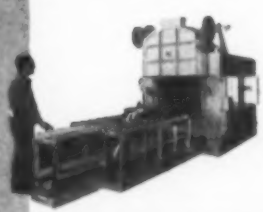
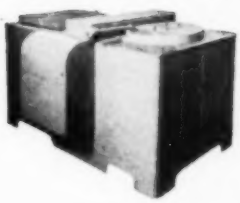
Production annealing and stress relieving furnace

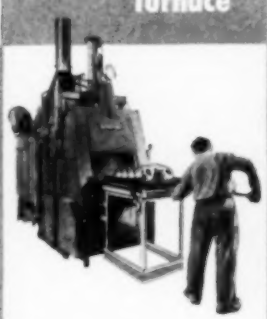




Lindberg-Fisher 2-chamber induction melting and holding furnace

High frequency induction heating unit

Carbonitriding furnace



Fisher melting and holding furnace (gas or oil fired)

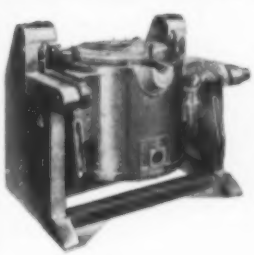


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Fig. 3. A lightning arrester is connected to each line where these four circuits enter the mill building.

Fig. 4. Surge capacitors and lightning arresters protect the circuit serving the fire pump motor in this building.

outdoor switchboard. The switchboard ground bus is connected to a 6- to 8-inch main water line or sprinkler line. We file the pipe and clean a good surface before strapping it with a 3/16 x 2 in. copper bus. The ground wire is connected to this strap with a good wire to copper bus connector. The ground wire in both instances is No. 4/0 bare stranded copper.

In some instances loads are connected to the substation bus through individual circuit breakers. Substation in Fig. 2 serves a boiler room line, a distribution line with a voltage regulator, a series fence lighting line, and a line from the switchboard for shop and supply room lighting. The boiler room line has lightning arresters on its first pole. The village distribution transformers are self-protected, and we have lightning arresters on each side of the voltage regulator. There are lightning arresters atop the pole too. The constant current regulator is the self-protected type.

Adjoining Buildings

Where a feeder line supplies a load in an adjoining building, we connect lightning arresters to the line as it leaves one building and to it as it enters the other. This is quite necessary where the switchboard is located in one building and its feeders supply loads in another. In Fig. 3 four circuits enter the mill with an arrester connected to each line. Some of our outside loads are at a distance from the mill or switchboard requiring a pole line. Here we install lightning arresters on each building or on the end poles. If the load is of sufficient importance we include a ridgewire over the line, and surge capacitors at the load. The ridgewire is grounded at each second or third pole.

There is a fire pump inside a building with an insurance company's recommended fire pump panel, which has surge capacitors on the line side. The ridgewire on this installation is No. 6 solid copper and the lightning arresters are nearby (see Fig. 4).

Another method of handling the end of a long exposed line is to extend the line one span beyond the load. We have one case where we have applied this principle. We have lightning arresters on the last two poles. It may be argued that this is of no consequence, but in any event it gives protection, and we have had no failures in this circuit.

We are installing a new overhead incoming line from the substation to our LaFayette Plant. The line is six 350 MCM bare copper and is 300 ft long with three spans. We have included a No. 2/0 bare copper ridgewire grounded at each pole and to the water system at the mill. The ridgewire is connected to the substation ground as well. There are lightning arresters for each wire on the pole nearest the substation and at the mill wall. Two three-phase surge capacitors are mounted on the mill wall and connected to the line.

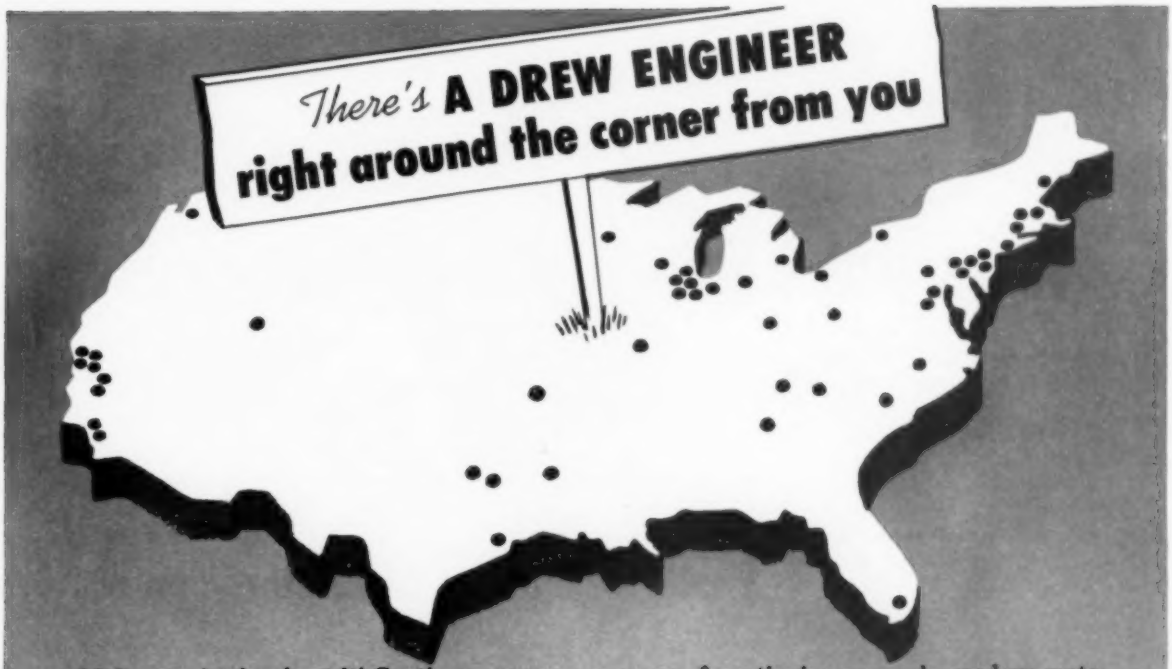
Motor Failures

We have installed lightning protection equipment on all new lines and the old lines were already equipped. Regardless of this, we still have motor failures during lightning storms that can be attributed only to the lightning surges coming in through our switchboards and on our lines, or generated in the long mill networks supplied. As best I can determine, our failures are on motors that have been in service for quite some time. Therefore, the indication is that the smoothed out voltage wave of a lightning stroke through the arresters is enough overvoltage to break down weak points in motor insulation. The preventive I see for this is regular insulation tests with repairs made immediately on motors with weak insulation.

Grounds

Poor grounds is another reason for motor failures during lightning storms. With a high resistance ground, the lightning arresters and surge capacitors are

(*Continued on page* 117)



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"Q & A" for the Man-in-the-Plant

Electrical Equipment Fundamentals

By **A. T. LOHKAMP,** Superintendent of Power Plant,
Pasco Packing Co., Dade City, Florida

Part 7—Selecting Generators and Motors

This is the last of a series of 7 "Q & A" articles presented to help plant men become more intimately acquainted with the electrical equipment in their charge. A thorough understanding of the points covered will improve operation and maintenance, and help employees advance to higher positions.

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Part 5—Single Phase Motors	*June '53*
Part 6—Technical and Design Data	*July '53*
Part 7—Selecting Generators and Motors	*This Issue*

Q—What important features must be considered in selecting a generator?

A—If the generator is needed to augment the capacity of an existing plant or system, the kind of current, the voltage, number of phases and frequency must correspond with those of the generators in service. If the generator is for a new plant these features must be determined before a selection of type and size can be made.

For a small and compact isolated plant or building, a direct current 115 volt, two wire system or a 115-123 volt three wire system is most likely to be used. If the demand is expected to be for power to drive machines at variable speeds, direct current is preferable because it offers better speed control of motors, provided the system is not so large as to require an inordinately large investment in heavy feeders to keep down line losses.

For serving a group of buildings more or less scattered, like a large institution or extensive industrial plant or even an entire community, alternating current is almost certain to be chosen on account of the economy of distribution over long lines. The generator voltage will depend on the length of the lines and is likely to be between 220 and 2,300 volts. Generator voltages up to 11,000 are sometimes used to obviate the need for step-up transformers, but the higher voltages require more expensive insulation for the generator armature windings.

Sixty cycles per second is now almost invariably the standard frequency for general alternating current service. Single phase supply is usually confined to lighting systems with very little power load. Of the polyphase systems the two-phase is now seldom used, as the three phase system is somewhat more economical.

Having selected the current, voltage, frequency and phase, the next thing is the generator drive, which depends on the kind and size of prime mover to be used. The smaller generators are usually belted to their drivers. Engine type generators are designed for direct connection to relatively low speed engines. The engines being most commonly Diesel type oil engines, gas engines, steam engines, or horizontal shaft hydraulic turbines. Two thousand kw is approximately the limit for engine type generators. The largest generators are driven by high speed steam turbines or hydraulic turbines; the former are called turbogenerators and are now being built with ratings up to approximately 200,000 kva. The kind of drive affects the speed and general design of a generator, especially so when it is a large high speed turbine drive.

The ratings of the generating units in a well designed plant

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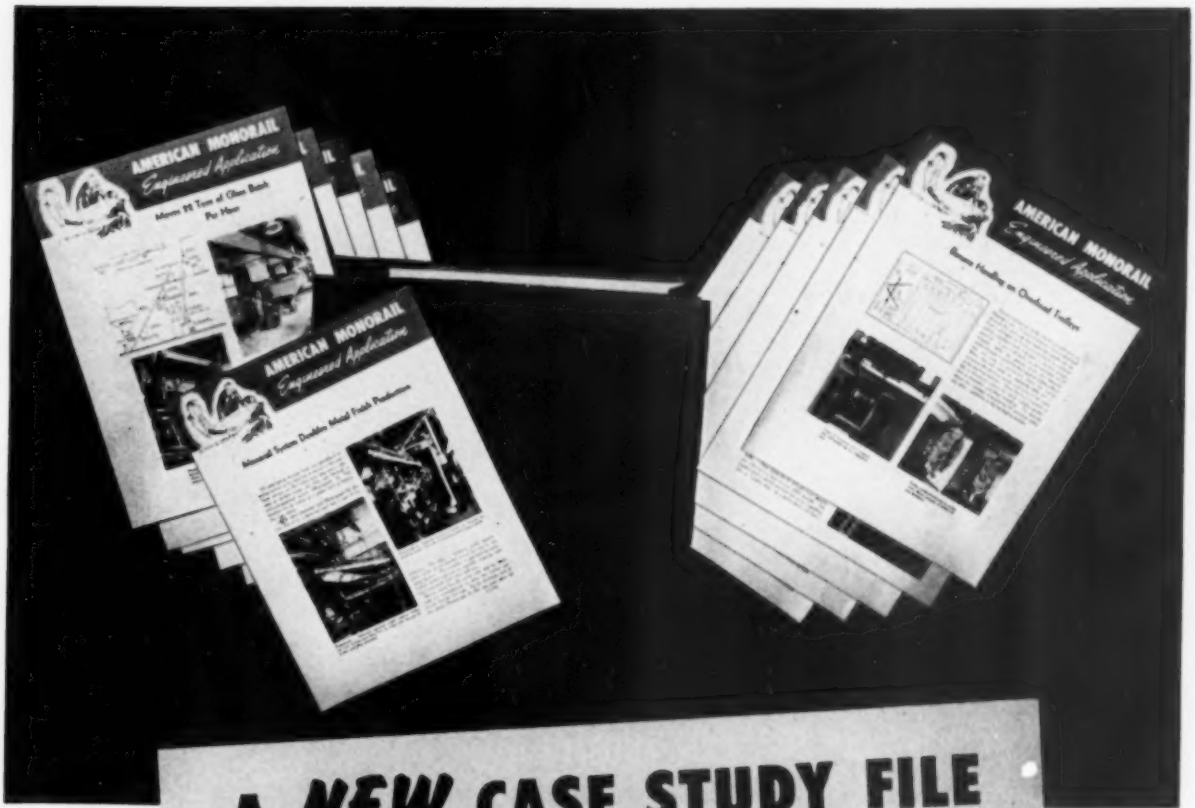

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should be so chosen that the smaller one will carry the light loads, the larger one the intermediate loads, and both the maximum loads expected. Thus the machines may operate at approximately full load, which is usually the range of highest efficiency in generators and in prime movers. The machines must be so constructed that they will operate satisfactorily in parallel. They should be efficient, easily maintained and reliable. And for important service, a spare unit is indicated.

Q—What are the chief features to be considered in selecting motors?

A—Before attempting the selection of a motor it is necessary to know what will be required of it as to frequency of starting, magnitude of starting torque, consistency of running speed, necessity for speed variation, variability of load, overload capacity, temperature and humidity of surrounding atmosphere, presence of dust or explosive gases, and position of motor with respect to the driven machine, or, whether horizontal or vertical. It is also necessary to know of any special limitations that may be imposed by supply circuit requirements, such as low starting current and high power factor.

It is assumed that the questions of the current, voltage, frequency and phase have been settled, as outlined in the preceding query.

If direct current supply has been installed, the selection of motors is greatly simplified because the available types of motors are reduced to three and each of these has very desirable characteristics for certain kinds of work. For starting moderate loads infrequently and operating them at constant speed the shunt motor is most desirable. For operating at speeds adjustable over a wide range, each setting to be unaffected by load, this same motor is used with field resistance control. For starting heavy loads frequently and operating at any speed that may suit the load, or with a moderate amount of adjustment of such varying speed, the series motor is excellently adapted. For operating loads more or less frequently, but with less variation of speed with load, the compound motor serves best. If greater torque is required only at starting, the series field of the compound motor may be cut out after starting.

Thus practically any service requirement has a suitable type of direct current motor, better than most corresponding types of alternating current machines. Especially is this true of adjustable speed operation for which the shunt motor has no peer.

Because of the steadily increasing use of alternating current circuits motor selection is now becoming more restricted to alternating current types. For constant speed service and infrequent starting at ordinary loads the induction motor with low resistance squirrel cage gives very satisfactory results, especially where a rugged and simple machine requiring little attention is desired. If the starting torque does not have to be as high and if a high power factor is of importance, a synchronous motor should be considered. It can give a leading power factor, if desired, to overcome the lagging power factor of induction motors and it will run very efficiently at absolutely constant speed, but it needs direct current for excitation, and requires more skilled attention.

Where a higher starting torque is needed without excessive starting current, the double squirrel-cage induction motor is suitable. If a still higher starting torque and frequent starting are the conditions to be met, such as an elevator drive, the induction motor with high resistance rotor should be used.

The efficiency of these two induction types is somewhat lower than that of the low resistance squirrel-cage motor.

Another type of induction motor that meets the most exacting requirements of high torque with minimum starting current is the wound rotor of slip ring type with external resistances for the rotor circuit. This resistance is gradually cut out during starting and it may be cut in while running to secure gradual reduction of speed to about half of normal speed. This is the only type of polyphase alternating current motor used extensively for speed adjustment.

The compactness and good service obtainable from speed reducers make them worthy of consideration for use with alternating current motors where speed changes are desirable and a rugged motor like the squirrel cage type is preferred. If a wide range of quickly obtained and exact speed settings is necessary on only a few motors in a plant otherwise using exclusively alternating current, it may be a good plan to install a motor generator set to furnish direct current and use adjustable speed shunt motors.

For power service on single phase circuits the repulsion start induction motor is most likely to be chosen as it combines good starting and running characteristics.

In determining the motor ratings it is always well to choose sizes which will be loaded well up to their rated capacities. Formerly it was customary to select oversize motors, but this means that they may operate most of the time at only a small part of their rated load, which results in low efficiency; and, with induction motors, also in low power factor. Motors of standard speeds and ratings reduce the initial investment as compared with "specials" and are much more readily obtainable.

Thought must also be given to the mechanical features of the motor, such as the bearings and enclosure. For most applications ball bearings are to be preferred. Their higher efficiency, decreased maintenance, and freedom from trouble soon pay for their slight additional cost.

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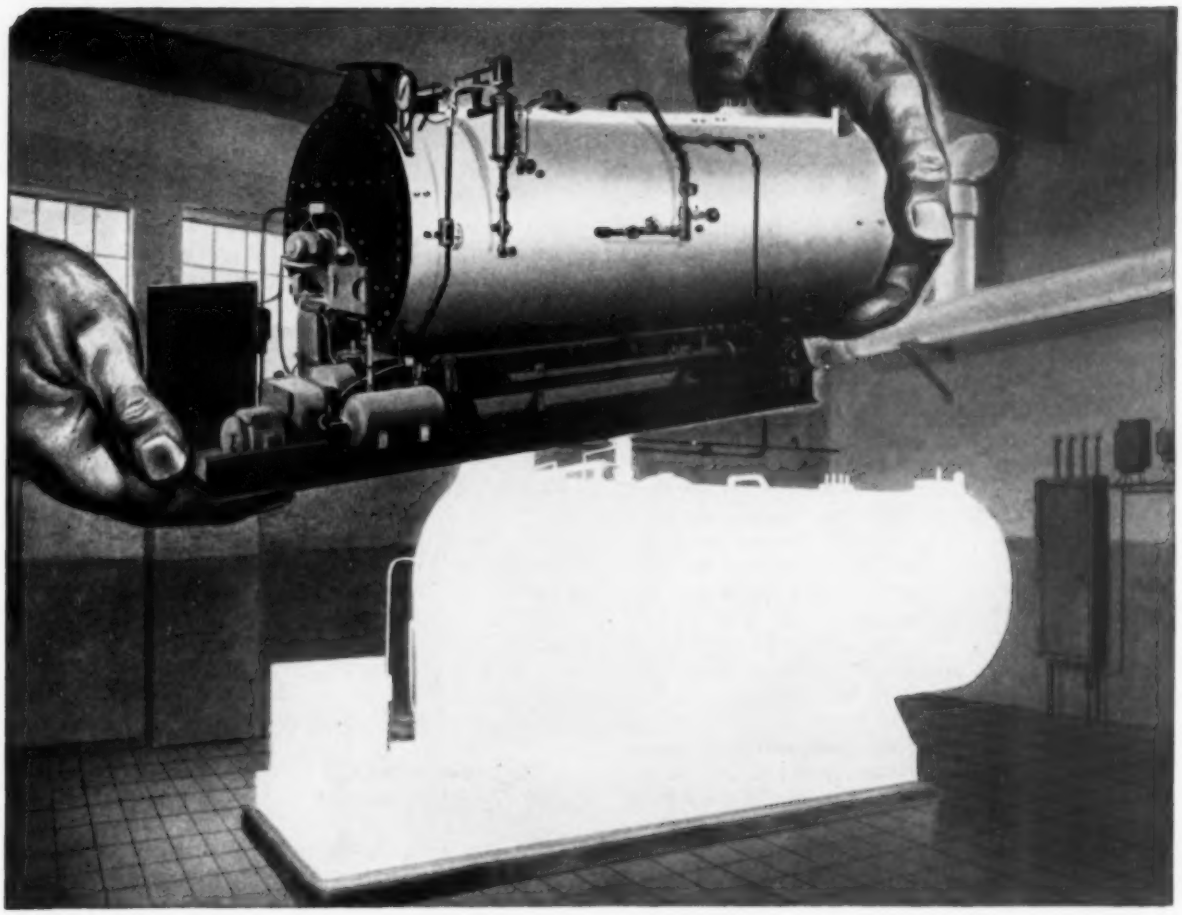

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Get More From Your Elevators

At the recent Materials Handling Exposition, Otis Elevator Company engineers demonstrated several ways in which elevators can be made an integral part of the material handling system. These 17 ways to get more from your elevators will help you to co-ordinate them with other pieces of equipment for most economical use.

1. Elevators should not wait for loads. Expensive equipment such as fork-lift trucks should not wait for an elevator. Provide loading space near the elevator so that loads can be accumulated. Power equipment should deliver material to a loading area and leave without waiting. Material can then be loaded on the elevator by less expensive equipment such as a jack-lift (manual or power operated).

2. Base elevator use on a complete survey of materials-handling. Objective is to minimize floor-to-floor, point-to-point handling time. The elevator operator is an integral part of the vertical phase of the entire materials-handling problem. Make sure that the operator understands the function of the elevator in the overall plan. In cases where an elevator pick-up schedule is adopted, the operator should understand the purpose of the system and be supervised sufficiently so that he adheres to the schedule.

3. Install roller conveyors permanently or temporarily on the elevator car floor. Loads can be pushed on or off with a minimum of time and effort. Place roller conveyors in loading and unloading areas so that loads can be accumulated on them and easily rolled into the elevator. Temporary accumulation storage near elevators reduces elevator waiting time.

4. Over-head monorails—where monorail conveyor systems exist, they can easily be tied in with the elevator by short sections of monorail attached to the car roof and connected by switch to the main systems.

5. Use trailers that can be towed or pushed on the elevator by power-truck.

6. Build special wheeled dollies to carry standard sub-assemblies to and from elevator and throughout plant.

7. Make better use of palletized loads for obtaining capacity loads on each trip.

8. Use bins, shelf trucks and other containers on **wheels, rollers** and **castors** to get capacity loads quickly and easily.

9. Install faster-opening, bi-parting, power-operated doors. In many old plants the elevator doors are one-piece, manually operated. Bi-parting doors open twice as fast as one-piece doors. Power operation will further cut time lost in loading and unloading. Doors can safely begin to open as the elevator approaches the landing so that the load can be handled as soon as the elevator stops.

10. Where elevator has door at one end only, consider putting a door at the other end. Avoid congestion and bottlenecks by providing a choice of loading areas. Save handling time by loading each end simultaneously.

11. Where several elevators are used in a bank, co-ordinate them by telephones in each car and at each landing connected to a central dispatcher, or by an automatic dispatching system.

12. Equip your elevator for self-leveling. It takes a good operator to come within $\frac{3}{8}$ of an inch of the floor on the first try, yet this is automatic with self-leveling. Loads can be handled more quickly and safely if the elevator is always level with the floor. Impact loads on the elevators are reduced, as is damage to the material being carried. The elimination of "jockeying" even saves some power.

13. Install automatic controls to speed service and reduce costs of running the elevator.

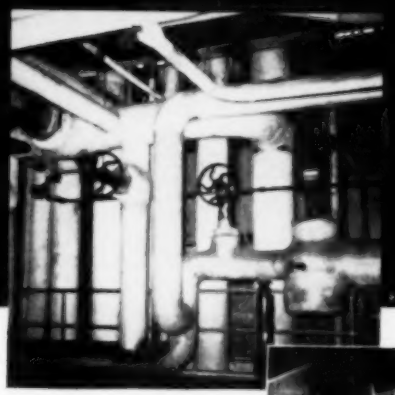
14. Use push-buttons on pendant fixtures so that power-truck operator can call elevator without dismounting.

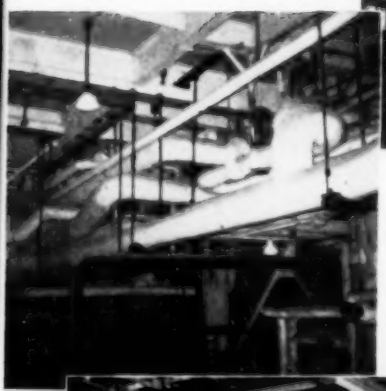
15. Take advantage of gravity for down-flow. Consider other types of conveyors such as spiral chutes installed at key points which will deliver material to the next production process by gravity and relieve some of the "down" traffic on the elevator.

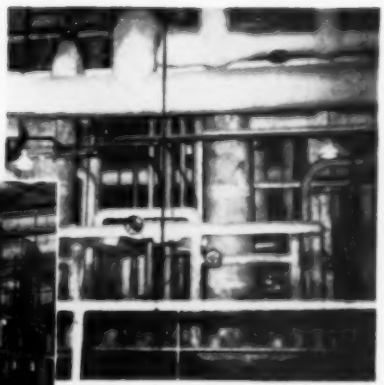
16. Survey your vertical transportation system to determine whether light, frequent loads, now causing an elevator bottleneck can be carried by other means such as a dumbwaiter or a small, inexpensive, auxiliary elevator. Heavy personnel traffic, if a problem, may be carried on escalators or by self-service passenger elevators.

17. Many older plants consist of a series of buildings erected at different times over the years. Different building heights and different floors levels may cause transportation problems. An elevator with doors at each end can be installed between separate buildings to facilitate transfer from one to the other. Where buildings adjoin, an elevator installed in the tallest one will serve all levels in both buildings.

POWER PIPING that fits like a glove







That is why Blaw-Knox is so often selected to do critical jobs. Whether it's for power or processing, we are well aware that piping requires the specialized knowledge of both engineer and designer as well as the skill and experience of the fabricator. Here you will find the facilities, the staffs, the equipment and the *incentive* to handle any size piping job quickly, authoritatively, economically. And the results speak for themselves during installation as well as over the years ahead.

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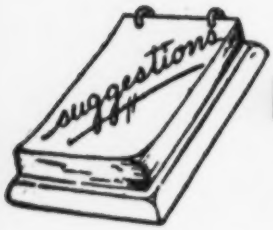


HELPING the *MAN-IN-THE-PLANT*

ideas . . . tools . . . methods . . . devices

Unusual Capping Operation Makes Possible Plunger Reclaim

A CRUDE oil pipeline, which relies on reciprocating duplex plunger pumps for building up the line pressure, found that leakage was occurring around the flanges where the plungers are attached to the pump crossheads. Since no fluid should have been inside the hollow in the center of such plungers (provided to reduce the over-all weight), each plunger was withdrawn from service, the core hole through the plunger neck cleaned, bored and tapped, and plugs screwed in to seal off the space within the castings.

This eliminated the leakage at the crosshead, and was satisfactory until it was found that the plungers had worn hour-glass shape to such an extent that it was impossible to maintain satisfactory packing. To restore the true cylindrical shape, it was decided to metallize the worn areas with 420 stainless steel.

The plungers were withdrawn from service, rough turned to present the typical surface for metallizing, and the coating applied. After grinding and replacing the rebuilt plungers in service, it was found that oil was still working into the casting, building up line pressure there of about 800 psi, and working under the thin knife-like edge of the stainless steel, raising it and forming a cutting "tool" which rapidly cut out the packing.

The plungers were then withdrawn from service a second time, and the casting checked carefully for points of entry of the fluid. It was found that the nose end was porous and that droplets of oil would appear on its surface when a plunger was slightly warmed to build up pressure within the cavity. The plungers, of cast iron, were cast vertically, with the flange end down. Thus the nose was subjected to the least head of molten iron during cooling, and the porous condition resulted. To prevent this end or nose leakage into the plunger cavity, each unit was faced off on the end, and then a new tip, one-half inch in thickness, was built up by brazing. This was turned to size and end-faced at the same time the plungers were rough-turned as preparation for metallizing.

When metallizing was again applied, no further trouble was encountered from the leakage of oil from within the plunger against the matrix side of the metallized stainless steel.

By M. T. PATE
Industrial Consultant

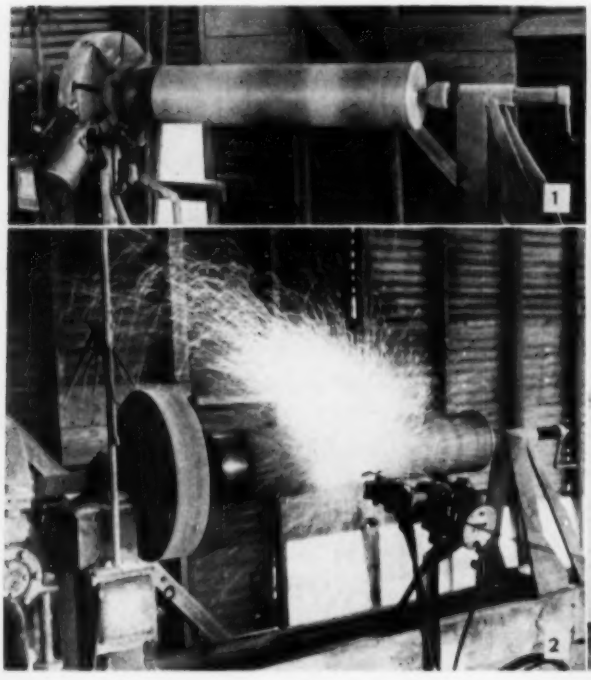
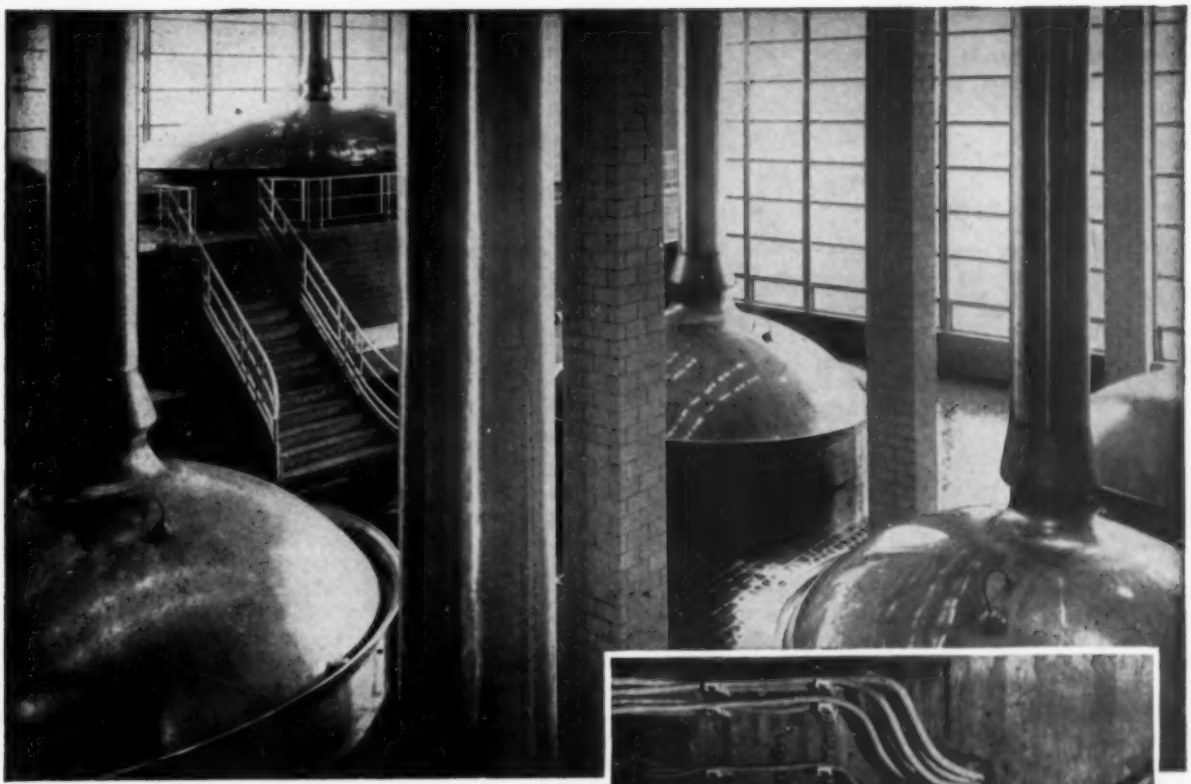


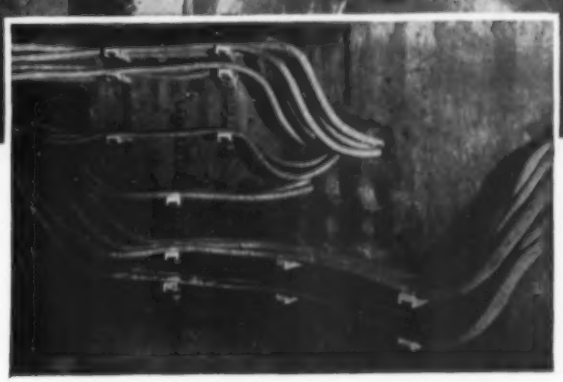
Fig. 1. Mounted in the same lathe on which the plunger will be metallized, it is first sand-blasted to remove all dirt, grease and other foreign matter from the rough-turned casting.

Fig. 2. Revolving at a speed which, when combined with the feed of stainless steel rod through the metallizing head, will give the desired deposition of new metal, the plunger is being built up to a diameter which will allow finish-grinding to the desired diameter. The diameter is checked through the spray of molten metal.

Fig. 3. A finished plunger, standing in the position in which it was cast in the foundry, and with the half-inch brazed brass cap clearly visible on the nose (top) of the unit.

Photographs courtesy General Metallizing & Machine Company, Houston, Texas





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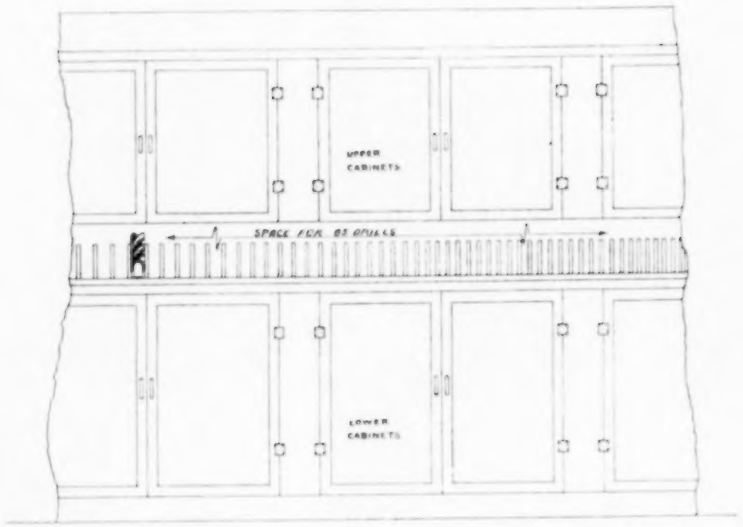
Drill Bit Storage



HOW often have you searched in vain through a tool box looking for the larger drill bit sizes required for machine shop operation only to find that the one size needed is missing or has been damaged and dulled by other drill bits dropped on top of it.

Mr. W. H. Leathers of Patterson Mills Company, the Master Mechanic, has an ideal solution for this problem. Note in the illustration that these large bits are stored out in the open in the tool room in a neat row along the cabinet top. Each bit is returned to its proper place after being used. A quick glance at the row of bits will reveal if one is missing at the end of the day. Since each bit is separately placed, there is no damage or dulling due to contact with other bits or tools. Keeping the storage space clean is a simple matter, inasmuch as each bit is used frequently.

The cabinet top was built on a sharp angle, so that extra supplies or tools cannot be carelessly set down either on top of the bits or elsewhere in the tool room. All supplies must be stored in the proper storage cabinet in order to get them out of the way.

We feel that Mr. Leathers has devised an ideal method for the storage of large bits and the general housekeeping of his tool room.—*R. J. Tucker, Jr., Plant Engineer, Patterson Mills Company, Roanoke Rapids, N. C.*

Corrective Measures for Sticking Magnetic Contactors and Relays

MAGNETIC contactors and relays sometimes remain closed after their operating coils have been de-energized. This condition is generally termed "sticking." It is most apt to occur on small devices where spring pressures, tending to force the contacts open, are relatively weak.

Contactors and relays that are operated by d-c coils will always have some residual magnetism in their magnetic circuits after the coils are de-energized. The residual magnetism may be strong enough to hold the device closed after the operating coil is de-energized. This condition is described as "magnetic sticking." Magnetic sticking is not so common on devices that are operated by a-c coils.

Shim May Help

Magnetic sticking can be eliminated by adding a thin shim of non-magnetic material in the magnetic circuit. Convenient places to add the shim are on the face of the stationary core of the coil or on the corresponding face of the movable armature. This method of correction is very effective on d-c operated devices. It is not so satisfactory on a-c operated ones because the addition of a shim in the air gap area causes a-c operated devices to operate noisily and with a continuously pronounced humming noise. Fortunately residual magnetism is not so apt to cause magnetic sticking on devices operated by a-c coils.

Remove Lubricant

The air-gap surfaces on the stationary cores and movable armatures of a-c operated devices are closely fitted to obtain quiet operation. These surfaces are often filed to obtain close fits. To prevent rusting during shipment, with consequent noisy operation when put into service, the filed areas may be covered with a light coating of lubricant. This suface should be wiped clean of any excess lubricant before placing in service, because the excess lubricant may cause a "seal" that will hold small devices in the closed position after the operating coil is de-energized.

Dust and Dirt

Certain vapors and unusual atmospheric conditions will deposit sticky films on air-gap surfaces that may cause devices to stick in the closed position. Dust and dirt may cause tight bearings that produce unsatisfactory operation. Chemical plants, cement mills, grain elevators, ink vapors in printing press rooms, coal dirt, metal mills and similar installations are typical examples of atmospheric conditions that may cause devices to remain closed after operating coils are de-energized. Such conditions must be corrected by removing the dirt and dust with compressed air or vacuum cleaners or by wiping the surfaces clean with suitable solvents. — *L. W. Markle, Westinghouse Electric Corporation.*

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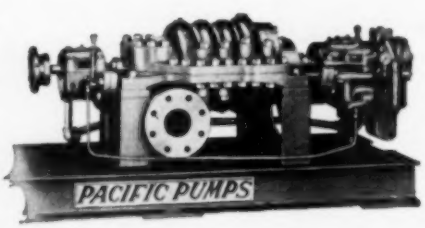

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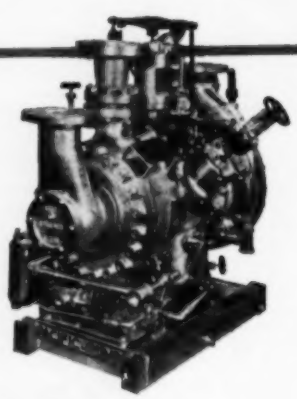

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Electric Motor Overload Protection

Adapted from comments by M. R. Brice, Cutler-Hammer, Inc., at the recent Textile Electrical Conference at Georgia Institute of Technology, sponsored by the American Institute of Electrical Engineers.

OVERLOAD protection now in general use for practically all a-c motors and for most d-c motors is *thermal* overload protection, using a thermal overload relay as a part of the controller.

We are concerned primarily with preventing damage to the motor due to overheating; therefore, we need to measure the cumulative heating effect of the motor current.

The designers make their thermal overload relays with heat storage characteristics similar to those of the motor, but enough faster so that the relay will always reach the tripping temperature before the motor reaches its danger temperature. A typical thermal overload relay, in 25 C ambient temperature, will trip on 600% rating in about 15 seconds, 300% rating in about one minute, and 150% rating in about 15 minutes.

High inertia applications, such as a cotton card drive, require slower tripping, which can be obtained with modified relay designs. A typical thermal overload relay for card service will carry 600% rating for 25 seconds.

Lower Temperature

The horsepower rating (and ampere rating) of a motor are based on the work the motor can do safely at an ambient temperature, that is, a surrounding air temperature of 40 C (104 F). By safely, we mean without reaching a temperature that would damage the motor insulation or shorten its life. At lower temperatures more commonly met, the motor can safely deliver considerably more power (12% more at 25 C) and for maximum production it should be permitted to do so. At higher ambient temperature it can do less work.

The controller normally is installed in the same room as the motor, subject to the same ambient

HIGHGROVE, CALIFORNIA. California Electric Power Company's new, modern 60,000 KW steam-electric generating plant now in commercial operation here was designed, engineered and constructed by The Fluor Corporation, Ltd. Many design innovations make this plant one of the most unique in existence. Except for the control rooms and switch gear the plant is completely outdoors and was planned for operation with an absolute minimum of attending personnel. The entire job was completed in advance of the originally scheduled operating date notwithstanding the extreme difficulty of obtaining some items of material and equipment. Additional units are being added to bring the total output to 140,000 KW.

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temperature as the motor. The tripping characteristics of the properly designed thermal overload relay then will be affected by room temperature exactly as the motor is affected. This is done by designing the relay to trip at 98 C, the danger temperature for the motor windings.

Only two types of temperature sensing devices are now in general use. One uses the flexing of a bimetal to trip a latch or operate a contact. The other depends upon the melting of a solder or eutectic alloy film to release a spring which operates the contacts.

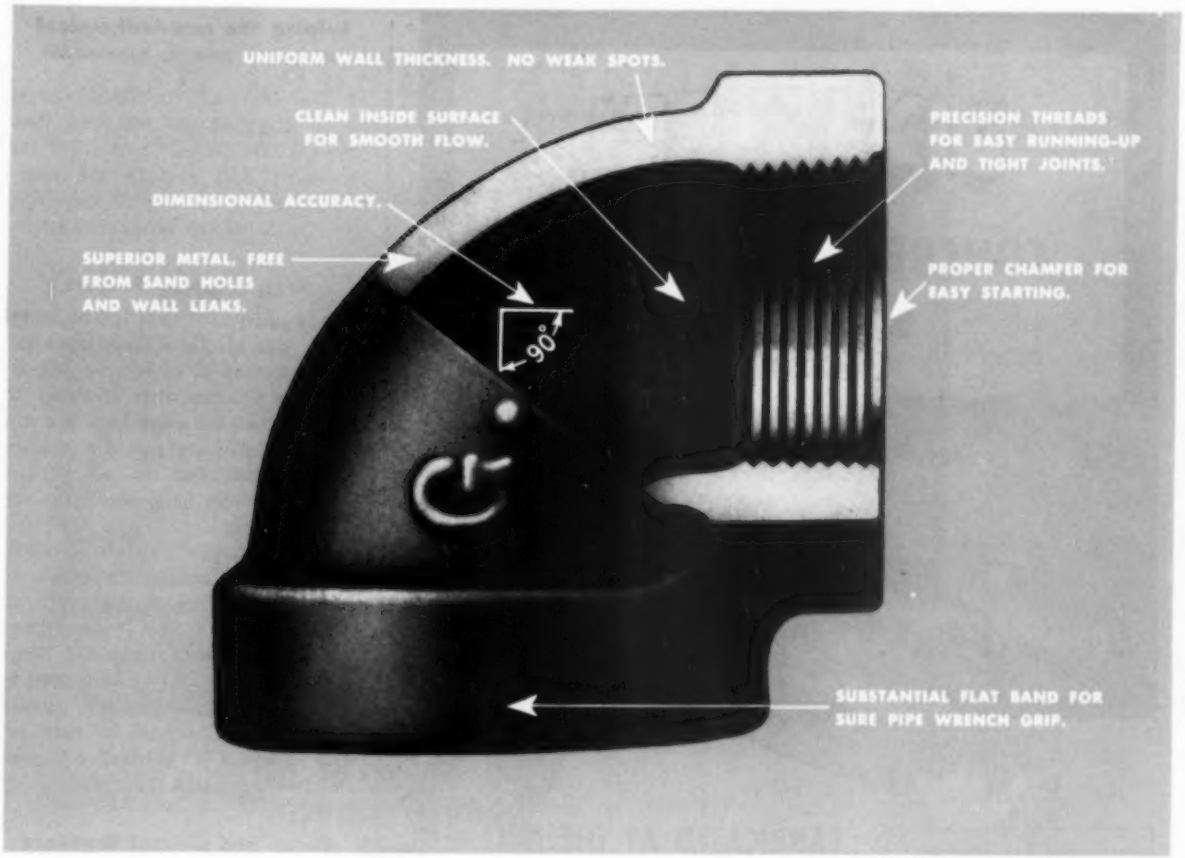
For most relays the increments between heater element ratings is 10%; for some as high as 14%; others provide ratings in 3% increments. The smaller the increments between heater element ratings, the closer the selection can be made to the actual motor rating, and the more work the motor will be able to do safely. The manufacturer publishes tables listing the heater elements and the range of motor current ratings with which each should be used.

Oversize Heater Coils

Users sometimes are tempted to install oversize heater coils, particularly when a relay trips with no external evidence of motor heating. It is dangerous to give in to that temptation, unless you have actual temperature rise data on the motor involved, indicating that the motor has capacity in excess of the normal service factor, and unless from that data you obtain the controller manufacturer's recommendation on the largest heater element that will protect the motor. The life of motor insulation is shortened drastically as its operating temperature is increased. Actual motor failure may not occur until a year or more after overloading.

The Underwriter's Laboratories test motor controllers complete with enclosure, overload relay, and heater elements.

Shortly after a thermal relay trips due to an overloaded motor, both the motor and the thermal relay will cool enough so that the motor can be restarted. The cause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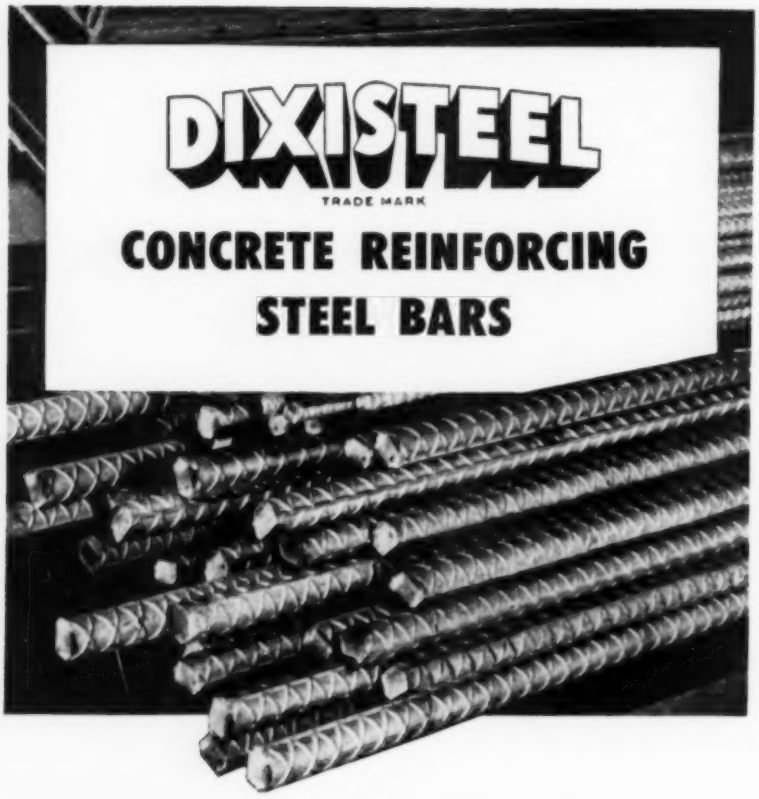

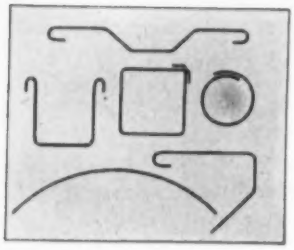

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PUNCHING • HOT-BENDING • DESCALING
LIMING • PICKLING AND OILING

of the overload condition should be investigated and removed, then pushing the "reset" button on the controller will restore the overload relay to its original condition and the motor can be started again.

Free Tripping Feature

It is important that the overload relay should be "free-tripping," meaning that it should be impossible for the machine operator to hold or block the reset button down and burn out an overload or stalled motor. Most, but not all, of the overload relays in general use are free-tripping.

"Manual reset" overload relays encourage the machine operator to remove the cause of the overload, and enforce at least a little cooling-off period after tripping. Some overload relays can be arranged to reset automatically but this usually is undesirable except in rare instances where the controller is completely inaccessible.

Fuses and Circuit Breakers

The overload relay in a motor controller is not intended to protect the line wiring against short circuit currents, or grounds, or faults within the motor, nor is it able to do so. The thermal overload relay is designed to operate to protect the motor under any conditions of locked rotor current or less. The controller itself is capable of interrupting ten times motor full load current, but fault currents will be many times greater than that. There must be fuses or a circuit breaker installed ahead of the controller to clear any such faults that occur.

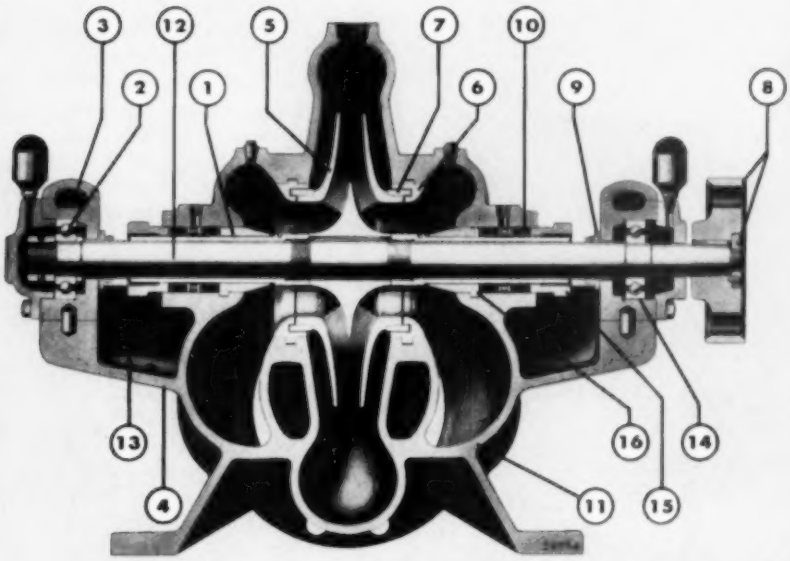
When the standard was adopted many years ago, the choice of two overload relay elements instead of three was perhaps justified. It seems quite likely that in a few years three-element overload relays will completely replace the present commonly used two-element relays.

Current Unbalance

Fifteen per cent unbalance in motor current sounds like something very unusual, but surprisingly, it takes less than 2% voltage unbal-

DE LAVAL
SINGLE STAGE CENTRIFUGAL PUMPS

for dependable industrial service



Labyrinth wearing rings minimize leakage...maintain high efficiencies

Labyrinth rings used in these De Laval pumps retard flow of water through labyrinth passage.

Flat rings showing relatively unimpeded flow of water.

(1) **Shaft Sleeves** are screwed on, to abut the impeller and make a water-tight joint. Sleeve expands freely and independently of shaft when temperatures change. There is no tendency to buckle.

(2) **Thrust Bearing** locates rotor axially.

(3) **Bearing Caps** easily removable for maintenance.

(4) **Bearing Brackets** scraped to lining bars for perfect alignment.

(5) **Impeller** hydraulically balanced, finished on all surfaces.

(6) **Labyrinth Wearing Rings** held accurately in machined grooves in both case and cover.

(7) **Impeller Wearing Rings** threaded on impeller, opposite to rotation.

(8) **Flexible Coupling** ground on all exposed surfaces and statically balanced, complete coupling supplied, pump half mounted on taper so that it can be easily removed. Check nut locks coupling on taper.

(9) **Deflector** keeps water out of bearing.

(10) **Stuffing Boxes** extra deep; lantern rings for water sealing.

(11) **Pump Case** horizontally split; machined to limit gages.

(12) **Steel Shaft** ground to limit gages.

(13) **Drip Boxes** large; provided with drain openings.

(14) **Radial Bearing** free to move axially, thus avoiding temperature strains.

(15) **Glands** split horizontally.

(16) **Protecting Bushings** renewable.

You can count on the performance of the De Laval Single Stage Centrifugal Pumps because they are precision-made to high manufacturing standards and incorporate the many quality design features shown in the cross-section.

They operate at high or low speeds, at high or low heads...with maximum efficiency.

For example, De Laval G, I and K Single Stage Double Suction Pumps have a capacity range of 175 gpm to 6,000 gpm, and heads to 300 feet. They are available in sizes ranging from 4" suction and 3" discharge to 14" suction and 12" discharge. Write for Bulletin 1002.

DeLaval also furnishes larger centrifugals for capacities up to 70,000 gpm.

DE LAVAL *Centrifugal Pumps*

DE LAVAL STEAM TURBINE COMPANY
817 Nottingham Way, Trenton 2, New Jersey

DL 198

2 Accelators®

DO A BIG JOB IN A SMALL SPACE!

in a South American **DISTILLERY**

Two 44' diameter Accelators treat 2800 gpm of Parana River water for clarification and color removal at a San Nicolas distillery in Buenos Aires. A portion of the treated water is used for boiler feed with supplementary treatment.

Elevated to provide gravity flow of clarified water to filters located over a clearwell, these Accelators provide water supply in a fraction of the space required by other types of water treating equipment.

Learn how the Accelator can solve your water treatment problem in *less* space at *lower* cost. Send for informative, illustrated bulletin (see coupon below).

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INFILCO INC. *Tucson, Arizona*

Plants in Chicago & Joliet, Illinois

FIELD OFFICES IN 26 PRINCIPAL CITIES

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INFILCO INC., Box 5033, Tucson, Arizona

Please send us your Accelator Bulletin 1825-U

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TITLE_____

COMPANY_____

STREET_____

CITY_____ ZONE____ STATE_____

ance on a motor operating at rated load to cause 15% unbalance in motor current, 3% voltage unbalance will cause nearly 25% higher current in one line, and that means 56% overheating of one motor winding.

The need for a general change to three element overload protection appears obvious; however, three-element protection is not yet commercially available in small manual motor starters. A great deal can be done right now, and here are some suggestions:

(1) A close check on operating line voltages, not only at the incoming line but also close to the motor terminals, may reveal unbalances that can be corrected. Remember, even a slight unbalance can cause trouble.

(2) Carefully avoid unbalanced single phase loads.

(3) Watch out for any distribution system where one or more large motors may feed back power to smaller motors under open phase conditions.

Wherever past experience has indicated motor trouble due to single phasing and unbalanced voltages, seriously consider three-coil overload protection for all new installations.

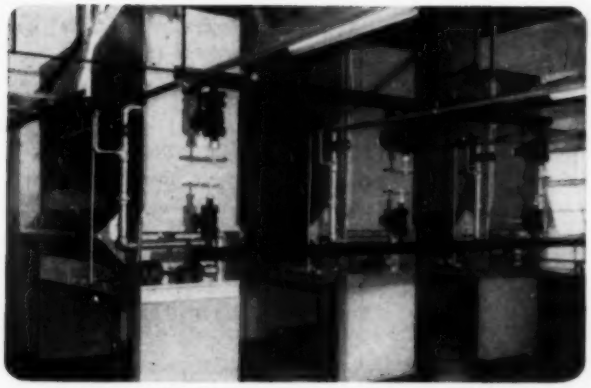
Oxy-Acetylene; Maintenance Tool

(*Starts on page* 55)

The development of the oxy- acetylene procedure for hard surfacing and overlaying has been of major importance in the economy of our maintenance operations.

We have found some excellent applications for these methods of hard-surfacing, such as on chipper bed plates, conveyor chains, wear plates, slitter knives, valve seats and many others far too numerous to name at this time. Several applications are illustrated.

Metal spraying has proven to be most effective in the rebuilding of the various types of shafts in our plant. In many instances, through this metallizing procedure, a harder



Frick Evaporative Condensers Save Both Power and Water.

Save Money with Modern

Purgers keep condensing pressures down: patented manual and automatic types available.

TRADE FRICK MARK®

CONDENSERS

Your refrigerating system will operate more efficiently with this up-to-date equipment. Built in types and sizes to meet your exact needs—whether for ammonia or Freon. Let us quote now on your requirements: write, wire, phone or visit.

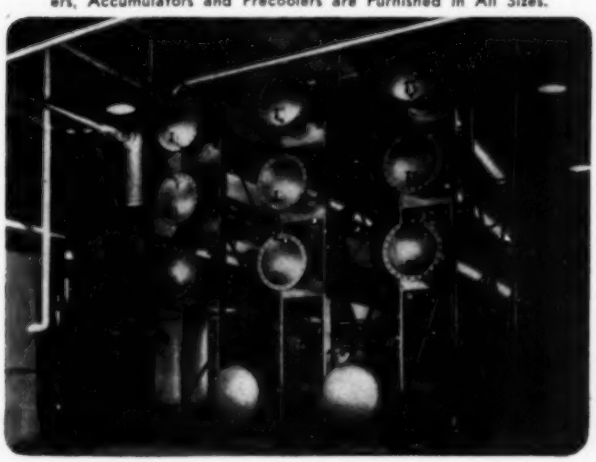
DEPENDABLE REFRIGERATION SINCE 1882

FRICK CO.

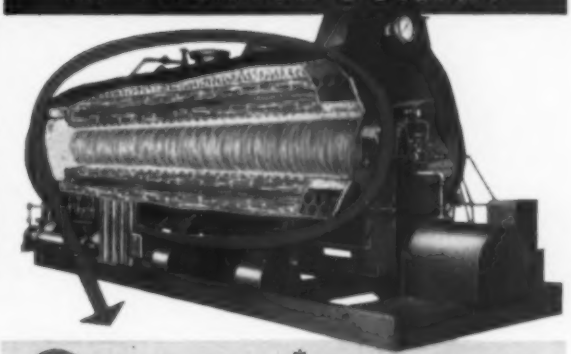
WAYNESBORO, PENNA. U.S.A.

Also Builders of Power Farming and Sawmill Machinery

Shell Condensers, Receivers, Oil Separators, Gas-and-Liquid Coolers, Accumulators and Precoolers are Furnished in All Sizes.



THE BIG DIFFERENCE IN PACKAGE BOILERS



CYCLOTHERM* CYCLONIC COMBUSTION gives you 66% MORE POWER per sq. ft. of heating surface

The cyclonic action of the flame revolves evenly in a free spiraling vortex the full length of the furnace and provides an even rate of heat transfer throughout the entire length of the combustion chamber.

This controlled combustion reduces heating surface requirements from 5 to just 3 sq. ft. per B. H. P. giving 66% more power.

Plus These Important Features

- **Saves up to ⅓ the Space of Conventional Package Units**
- **Guaranteed 80% Minimum Efficiency**
- **No Hot Spots or Flame Impingements**
- **Burns Oil, Gas or Both**
- **Savings up to 50% on Maintenance**
- **No Expensive Stacks or Foundations to Build**
- **Greater Fuel Savings**

And That's Not All . . .

Cyclotherm Steam Generators with *patented* Cyclotherm Cyclonic Combustion gives you: Full power operation from a cold start in 15 to 20 minutes; Built in accordance with A.S.M.E. and Nat'l. Board Standards and bears the label of Underwriters Laboratories Inc.; Complete range of sizes from 18 to 500 h.p., 15 to 200 psi operation pressure.

WRITE TODAY for your copy of "All Your Questions Are Answered by Cyclotherm" and find out why Cyclotherm Steam Generators have been proven superior in thousands of installations. Just drop a post card to Cyclotherm, Dept. 34 Oswego, New York.

*Reg. trade name

CYCLOTHERM STEAM GENERATORS

This is GARLOCK'S 3-Dimensional Picture

1. The Garlock representatives—112 of them—selling Garlock products and nothing else—making periodic calls on your plant—offering you the most complete line of mechanical packings manufactured by any company. These men are trained, experienced and, through interchange of information throughout the Garlock organization, conversant with your mechanical packing problems.

2. Twenty-three offices and three branch factories—with stocks of Garlock products—situated in most principal cities throughout the United States—convenient to you for prompt shipments and competent service.

3. Factories, laboratories, service engineers, resident engineers and pilot plant at Palmyra, New York—with background of sixty-six years' experience in the manufacture, application and development of superior quality mechanical packings—GARLOCK—The Standard Packing of the World.

This is the Garlock picture—unique in the mechanical packing industry. Take full advantage of it. It is yours for the asking.

THE GARLOCK PACKING COMPANY, PALMYRA, NEW YORK

Sales Offices and Warehouses: Baltimore • Birmingham • Boston Buffalo • Chicago • Cincinnati • Cleveland • Denver • Detroit • Houston • Los Angeles • New Orleans • New York City • Palmyra (N. Y.) Philadelphia • Pittsburgh • Portland (Ore.) • Salt Lake City • San Francisco • St. Louis • Seattle • Spokane • Tulsa.

Branch Factories: Birmingham • Denver • San Francisco,

In Canada: The Garlock Packing Company of Canada Ltd., Toronto, Ont.

GARLOCK

PACKINGS, GASKETS, OIL SEALS,
MECHANICAL SEALS,
RUBBER EXPANSION JOINTS

alloy is applied than was used in the original material, consequently the repaired part will give longer service than was previously obtained. The rebuilding of the worn shafts represents a sizable saving in itself. However, much more important is the economy derived from keeping the production equipment in continuous service for a longer period of time.

Welding

A considerable amount of stainless steel pipe is used in our mill due to the extreme corrosive conditions. The oxy-acetylene method is used for welding all small sizes of this pipe, primarily because all of our welders are equipped with an oxy-acetylene outfit. The simplicity and speed of this operation, together with the convenience of using this equipment in the many close places in which we work, give the oxy-acetylene method a definite economical advantage over the other methods that give longer life.

We also have a regular portable cutting machine equipped with a plate preparation attachment. This machine is frequently used for cutting and beveling ½ in. plate. One hundred ninety-two plates prepared this way were used in the fabrication of twelve diffuser tanks for washing pulp. Without the use of this attachment two operations would have been required, one to square and one to bevel each edge. Twelve thousand three hundred feet of cutting was required for this particular job. The use of this attachment reduced the cutting time 50 per cent, saving about 175 man hours.

We have six large barking drums that require rebuilding periodically. Their function is that of removing the bark from the pine logs of our southern forests. This is the first operation in the manufacture of paper. No discussion of oxy-acetylene usage in our plant would be complete without explaining the important part it plays and the enormous amount used in the rebuilding of these drums.

A close-up of some of the welds

(*Continued on page* 117)

Gone for good!

There's nothing quite as lost as profits that go up in smoke! We mean the profits from the valuable dust that's mixed with the smoke from many industrial stacks.

Alert Plant Engineers, seeking the most economical way to recover that dust, come to Buell.

Why? Because, for more than twenty years, Buell Engineers have specialized in this field. Their objective; better and more economical equipment. Their success; case histories that show the recovery of more than 40 tons of valuable dust *daily*.

To accomplish this, Buell Engineers analyze dust content in *advance*—can tell you the most economical way to reclaim its value.

Because of this sound approach, Buell serves dozens of America's Leading Corporations—some right in your own field. Why not send for some of the names?

Our informative brochure—The Collection and Recovery of Industrial Dusts—explains *all three* Buell systems of industrial dust recovery. For your copy, write Dept. 80-H. Buell Engineering Company, 70 Pine Street, New York 5, N. Y.

buell®

MECHANICAL ELECTRICAL

20 Years of Engineered Efficiency in

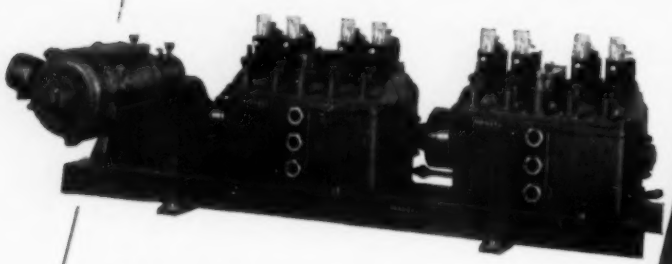
DUST RECOVERY SYSTEMS

HOW TO CURE

"Fluid-Feedosis"*

A CASE HISTORY

PROBLEM: Chemical Companies needed really dependable equipment for high pressure lubrication of compressor cylinders and bearings.



SOLUTION: Manzel developed a completely new line of heavy duty Force Feed Lubricators that pump S. A. E. 40 oil at pressures up to 30,000 PSIG. Enthusiastic reports of performance are being received from users.

*Difficulties in pumping chemicals, oils, and other fluids in accurate quantities for lubrication, chemical treating, or other purposes.

For the solution to lubrication difficulties, or chemical feeding problems, more and more companies are turning to Manzel. For 50 years a leader in the field, Manzel is today a flexible, fast-moving organization with the special technical skill for meeting *your* needs quickly and economically. Write for further information about Manzel Force Feed Lubricators and Chemical Feeders.

Safeguard high priced machinery with MANZEL FORCE FEED LUBRICATION

- Reduce Wear
- Prevent Breakdown
- Slash oil consumption
- Insure Round-the-Clock Operation

Manzel

318 BABCOCK STREET
BUFFALO 10, NEW YORK

A DIVISION OF FRONTIER INDUSTRIES, INC.

NEWS

Stockdale Appointed Southern Representative for Leslie Co.

ROBERT B. STOCKDALE has been appointed Southern District Representative for LESLIE CO. He will coordinate the activities of Leslie sales agents in the South and Southwest.

Robert B. Stockdale

Before assuming his new position, Mr. Stockdale was a sales engineer for the James T. Castle Company of Pittsburgh and handled the Peerless Pump Division Account for that firm, for a period of five years.

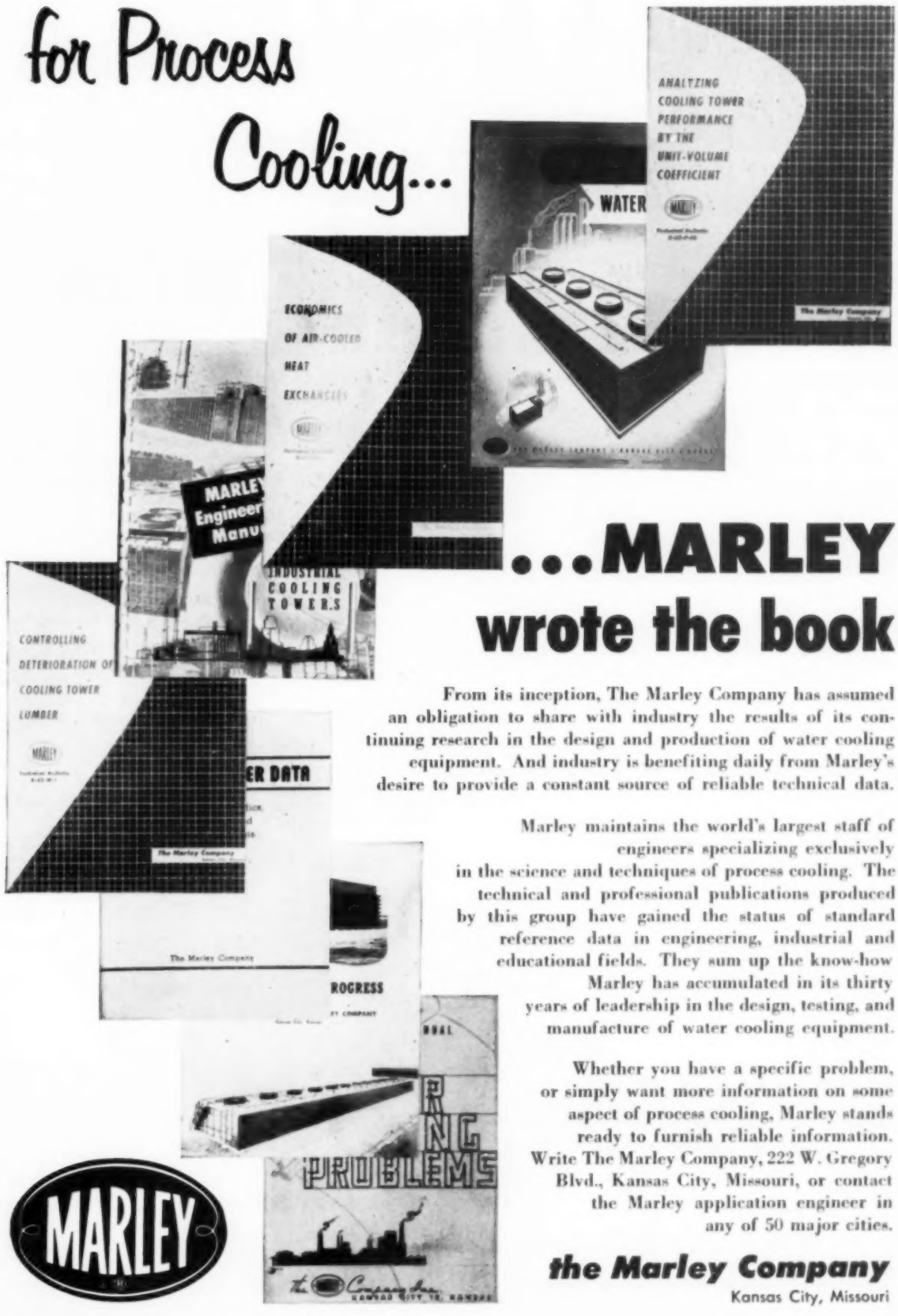
In joining Leslie Co., Mr. Stockdale has become associated with one of the oldest control manufacturers in the country, said company having been formed in 1900. The Leslie Co. plant and home offices are located at Lyndhurst, New Jersey. The Southern District territory includes all states south of Kansas, Missouri, Kentucky, and Virginia.

Welding Society Holds Houston Exposition

The annual meeting of the American Welding Society, held in the Shamrock Hotel, June 16 through 19, was the first at which an all-welding exhibition was combined with sessions of technical papers on various aspects of welding in industry. More than 1,400 members and guests were registered during the meeting, and the attendance at the exhibits, despite the fact that they had to compete with technical programs for showing time, was highly satisfactory. The 1954 meeting of AWS is scheduled for May, at Buffalo, New York.

Plant inspection trips held during the exposition included the A. O. Smith Corporation of Texas and the Hughes Tool Company.

for Process Cooling...



...MARLEY wrote the book

From its inception, The Marley Company has assumed an obligation to share with industry the results of its continuing research in the design and production of water cooling equipment. And industry is benefiting daily from Marley's desire to provide a constant source of reliable technical data.

Marley maintains the world's largest staff of engineers specializing exclusively in the science and techniques of process cooling. The technical and professional publications produced by this group have gained the status of standard reference data in engineering, industrial and educational fields. They sum up the know-how Marley has accumulated in its thirty years of leadership in the design, testing, and manufacture of water cooling equipment.

Whether you have a specific problem, or simply want more information on some aspect of process cooling, Marley stands ready to furnish reliable information. Write The Marley Company, 222 W. Gregory Blvd., Kansas City, Missouri, or contact the Marley application engineer in any of 50 major cities.

the Marley Company

Kansas City, Missouri

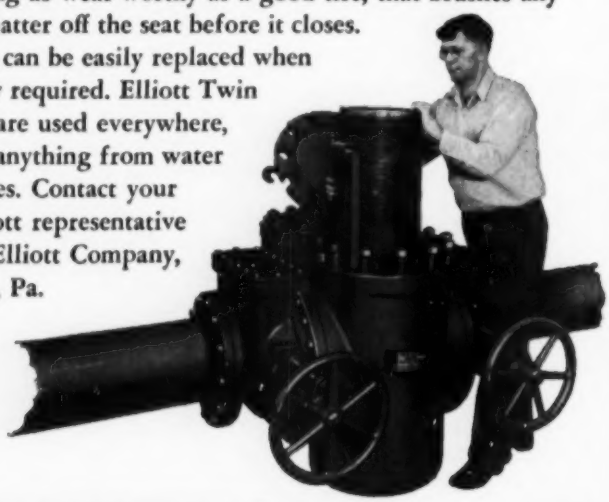
There's no "do it now" about cleaning an

ELLIOTT TWIN STRAINER

No need to interrupt some vital maintenance job to dump the fouled basket on one of these non-stop straining units. The alternate basket will take on the job with the turn of a couple of handwheels, cutting out the fouled basket for attention any convenient time within a reasonable period.

Not that cleaning is so much a job. It isn't—all that's necessary is to back off the cover nuts a few turns, spin out the washers, lift the cover, pull out the basket, dump it, and reverse the process. That basket is open at the top, too, for easy dumping. No fussing to get out the trapped trash.

TWIN STRAINERS have a number of features to help them keep on the job. Valve discs, for instance, have an inserted rubber ring as wear-worthy as a good tire, that brushes any foreign matter off the seat before it closes. This ring can be easily replaced when ultimately required. Elliott Twin Strainers are used everywhere, handling anything from water to molasses. Contact your local Elliott representative or write Elliott Company, Jeannette, Pa.



ELLIOTT Company

Accessories Dept.

A3-2

Jack E. Cooper

Diamond Chain—Atlanta

DIAMOND CHAIN COMPANY, INC., Indianapolis 7, Ind., announces the appointment of JACK E. COOPER as Southeast District Manager with headquarters at 92 Fourteenth St., ATLANTA, GEORGIA. Mr. Cooper formerly served as sales representative in the company's Chicago office.

FUTURE EVENTS
Of Engineering Interest

AMERICAN CHEMICAL SOCIETY, Alden H. Emery, Exec. Sec'y, 1155 16th St., Washington 6, D. C.
Sept. 6-11, Fall Meeting, Conrad Hilton Hotel, Chicago, Ill.

AMERICAN INSTITUTE OF CHEMICAL ENGINEERS, Stephen L. Tyler, Exec. Sec'y, 120 East 41st St., New York 17, N. Y.
Sept. 13-16, Fairmont and Mark Hopkins Hotels, San Francisco, Calif.

AMERICAN SOCIETY OF MECHANICAL ENGINEERS, C. E. Davies, Sec'y, 29 West 39th St., New York, N. Y.
Sept. 21-25, Industrial Instruments and Regulators Division and Instrument Society of America Exhibit and Joint Conference, Sherman Hotel, Chicago, Ill.
Sept. 28-30, Petroleum Mechanical Engineering Conference, Rice Hotel, Houston, Texas.
Oct. 5-7, Fall Meeting, Hotel Sheraton, Rochester, N. Y.
Nov. 29-Dec. 4, Annual Meeting, Statler Hotel, New York, N. Y.

PETROLEUM ELECTRIC POWER ASSOCIATION, Fred B. Clark, Chm. Publicity Comm., Arkansas Power & Light Co., El Dorado, Ark.
Oct. 5-7, Silver Anniversary Meeting, Muehlebach Hotel, Kansas City, Mo.

NATIONAL ASSOCIATION OF CORROSION ENGINEERS, A. B. Campbell, Exec. Sec'y, 1061 M&M Bldg., Houston 2, Texas
Oct. 7-9, South Central Region, Meeting, Mayo Hotel, Tulsa, Okla.

REFRIGERATION & AIR CONDITIONING EXPOSITION, W. A. Siegfried, Gen. Chm., Superior Valve & Fittings Co., W. Liberty Ave. & Brookside, Pittsburgh 26, Pa.
Nov. 9-12, Exposition, Public Auditorium, Cleveland, Ohio

EXPOSITION OF CHEMICAL INDUSTRIES, Charles F. Roth, Mgr. International Exposition Co., Grand Central Palace, New York 17, N. Y.
Nov. 30-Dec. 5, 24th Biennial Exposition, Commercial Museum and Convention Hall, Philadelphia, Pa.

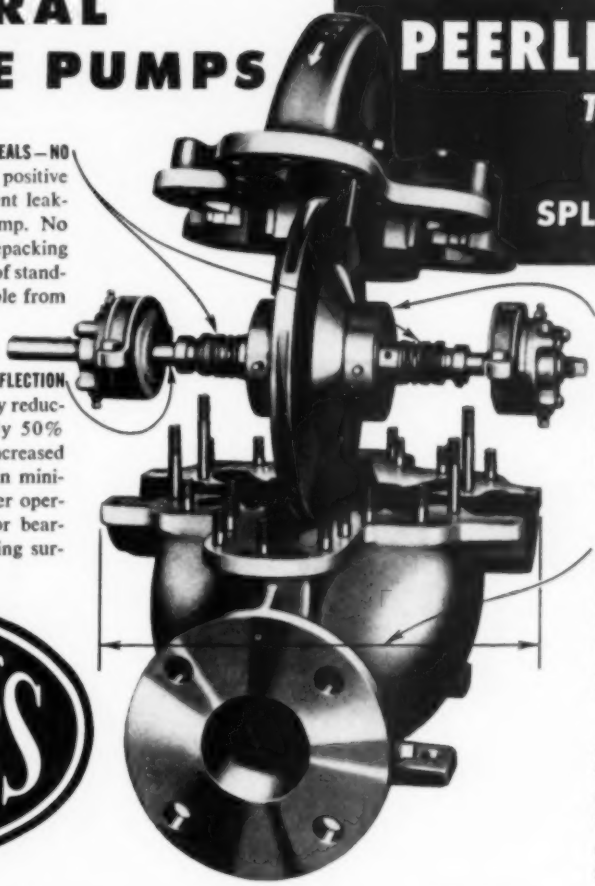
A NEW DESIGN

IN GENERAL PURPOSE PUMPS

PEERLESS Type AS HORIZONTAL SPLIT CASE PUMP

USES MECHANICAL SHAFT SEALS—NO STUFFING BOXES. Single positive acting, shaft seals prevent leakage of liquid from pump. No more down-time for repacking stuffing boxes. Seals are of standard design easily available from commercial sources.

SHORT SHAFT AND LESS DEFLECTION MEANS LONGER PUMP LIFE. By reducing shaft length nearly 50% Peerless has effectively increased shaft rigidity, resulting in minimum deflection, smoother operation and longer life for bearings, seals and all wearing surfaces.



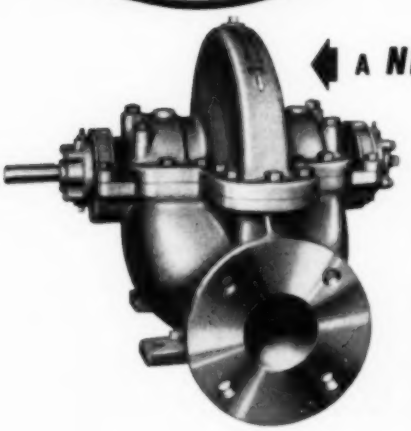
ENTIRE ROTATING ELEMENT LIFTS OUT AS A UNIT FOR EASY MAINTENANCE. Inspection or maintenance can be performed without disturbing piping connections or pump alignment. All parts on shaft can be removed with standard tools, on the job.

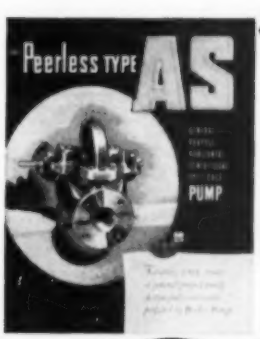
OCCUPIES HALF THE SPACE OF CONVENTIONAL DESIGNS. Floor space saving is made possible by elimination of packing gland housings. Provides more room for accessibility to piping, valves and control equipment.

CUSTOM PUMP—STANDARD PRICE. Type AS pumps cost no more than ordinary split-case pumps. Yet you get extra quality, without paying a premium. Proved in service.

PEERLESS PUMPS

A *NEW* PUMP DESIGNED AROUND MECHANICAL SHAFT SEALS





A *NEW* BULLETIN
that completely describes its advantages

Write for Bulletin No. B-1350 which completely describes and illustrates the modern design and construction features of Peerless Type AS pumps.

PEERLESS PUMP DIVISION
FOOD MACHINERY AND CHEMICAL CORPORATION
301 West Avenue 26, Los Angeles 31, California

Please send us a copy of Bulletin No. B-1350 describing Peerless Type AS Pumps.

NAME_____

COMPANY_____

ADDRESS_____

CITY_____ STATE_____

S. P. & I.

PEERLESS PUMP DIVISION
FOOD MACHINERY AND CHEMICAL CORPORATION
Factories: **Los Angeles, Calif. and Indianapolis, Indiana.**
Offices: **New York; Atlanta; Chicago; St. Louis; Indianapolis; Phoenix; Fresno; Los Angeles; Tulsa; Dallas, Plainview, and Lubbock, Texas; Albuquerque, New Mexico.**
Distributors in Principal Cities; Consult your Telephone Directory.

PEERLESS PUMPS

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FOR BETTER VALVE AND UNION PERFORMANCE:

FAIRBANKS®

All Star Team

An unbeatable combination — the "first string" team of valve and union for dependable trouble-free piping installations.

Look at the lineup:

U-01 BRONZE GLOBE VALVE

★ Renewable Composition Disc

Perfect sealing at all times—

A disc for every type of service—

#50—a hard disc for general usage

#52—a rubber disc for cold water valves

#60—a special synthetic disc highly resistant to gasoline, oils and many acids and alkalies.

★ Two Piece Union Bonnet
—Quick, easy disassembly
—No sliding or scraping between body and bonnet—NO WEAR

★ Radial Seat of Two Piece Union Bonnet
—Leak-proof Body Bonnet Joint
—Rigid alignment of all parts—guaranteed perfect seating all the time.

DART UNION

★ Ground Ball Joint having extra wide seating surfaces

★ Two Bronze Seats, non-corroding, on both sides of the seat

★ Leak-proof without excessive torque because of true bearing surfaces

★ High-test air-refined malleable iron body will not stretch, practically unbreakable.

THE **Fairbanks** COMPANY

393 LAFAYETTE STREET · NEW YORK 3, N. Y.

Branches:
New York 3 • Pittsburgh 25 • Boston 10 • Rome, Ga.

VALVES • DART & PIC UNIONS • TRUCKS • CASTERS

news (continued)

Bristol Company—St. Louis

SAM E. GEWIN has been appointed District Manager of the ST. LOUIS office of THE BRISTOL COMPANY, Waterbury, Conn., manufacturers of recording and controlling instruments.

Sam E. Gewin

After graduating from the University of Alabama in 1934 with a degree in Chemistry, Metallurgy and Ceramics, he was associated with the U. S. Industrial Chemical Company for 3 years prior to joining The Bristol Sales organization in 1937 as sales engineer. For the last five years he has been Resident Sales Engineer in the Buffalo area.

Mr. Gewin's new headquarters will be in the Cotton Belt Bldg., St. Louis 2, Mo.

Jervis B. Webb—Houston

JERVIS B. WEBB COMPANY, 8951 Alpine Ave., Detroit, Mich., has announced the opening of a new District Sales Office at 2343 Sheridan Road, HOUSTON 25, TEXAS.

Miles L. Croom

MILES L. CROOM, a native Texan and a graduate of Rice Institute, heads the new office which serves the Southern half of Texas.

8 cell cooling tower driven by 8 Wagner Multi-speed Motors.

Here's a job for *Rugged* motors

This 8 cell Marley Cooling Tower, at Pueblo, Colorado, provides a steady supply of 6600 gallons of cooling water per minute for a steam power plant. There are 8 fans with blades 22 feet in diameter that are driven, through gear reducers, by 8 Wagner two-speed, totally-enclosed fan-cooled motors. These 440 volt motors are each rated 75/19 hp.

Cooling towers need motors with plenty of stamina. They must operate without attention, day in and day out, completely exposed to all kinds of weather.

Wagner totally-enclosed fan-cooled motors are built to operate under severe conditions. They are available in steel or cast iron frames, in standard or explosion-proof types, single-speed or multi-speed, single phase, 2 phase or 3 phase, in ratings to 250 hp.

For your requirements, there is a Wagner Motor to fit every need—a complete line for all current specifications, with a wide variety of enclosure types and mountings. Bulletin MU-185 gives full information. Do you have a copy?

Your nearby Wagner engineer will be glad to help you select the *right* motors for your next application. Call the nearest of our 32 branch offices, or write us.

®Wagner Electric Corporation
EST. WE 1891

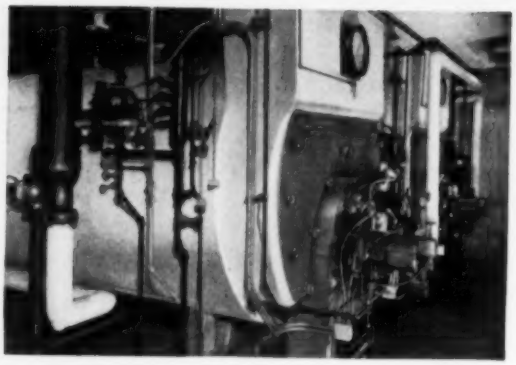
WAGNER ELECTRIC CORPORATION
6383 Plymouth Ave., St. Louis 14, Mo., U.S.A.

ELECTRIC MOTORS • TRANSFORMERS • INDUSTRIAL BRAKES
AUTOMOTIVE BRAKE SYSTEMS — AIR AND HYDRAULIC

BRANCHES IN 32 PRINCIPAL CITIES

M53-18

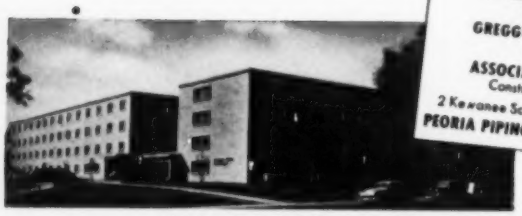
MORE ENGINEERING
MORE MATERIAL
MORE EXPERIENCE
MAKE THE DIFFERENCE



KEWANEE
STEEL BOILERS

Wherever Heat or Power or Industrial Process Steam is required there is a Kewanee Boiler just right for the job. And into every Kewanee goes *more of everything* that adds to a boiler's life and makes it most economical. Owners *expect more* from Kewanee Boilers . . . and they *get more.*

Pictured is a battery of two Kewanee Scotch-type Boilers, for low pressure in the boiler room of the Men's Dormitory, Bradley University . . . a Kewanee series which "stands on its own legs," needing no special setting and requiring comparatively little floor space or head room.



Men's Dormitory
BRADLEY UNIVERSITY
Peoria, Illinois
GREGG-BRIGGS & FOLEY
Architects
ASSOCIATED ENGINEERS
Construction Engineers
2 Kewanee Scotch Boilers installed by
PEORIA PIPING & EQUIPMENT CORP.

KEWANEE-ROSS CORPORATION
Division of American Radiator & Standard Sanitary Corporation
KEWANEE, ILLINOIS
Serving home and industry

Hagan Corp.—Tenn.

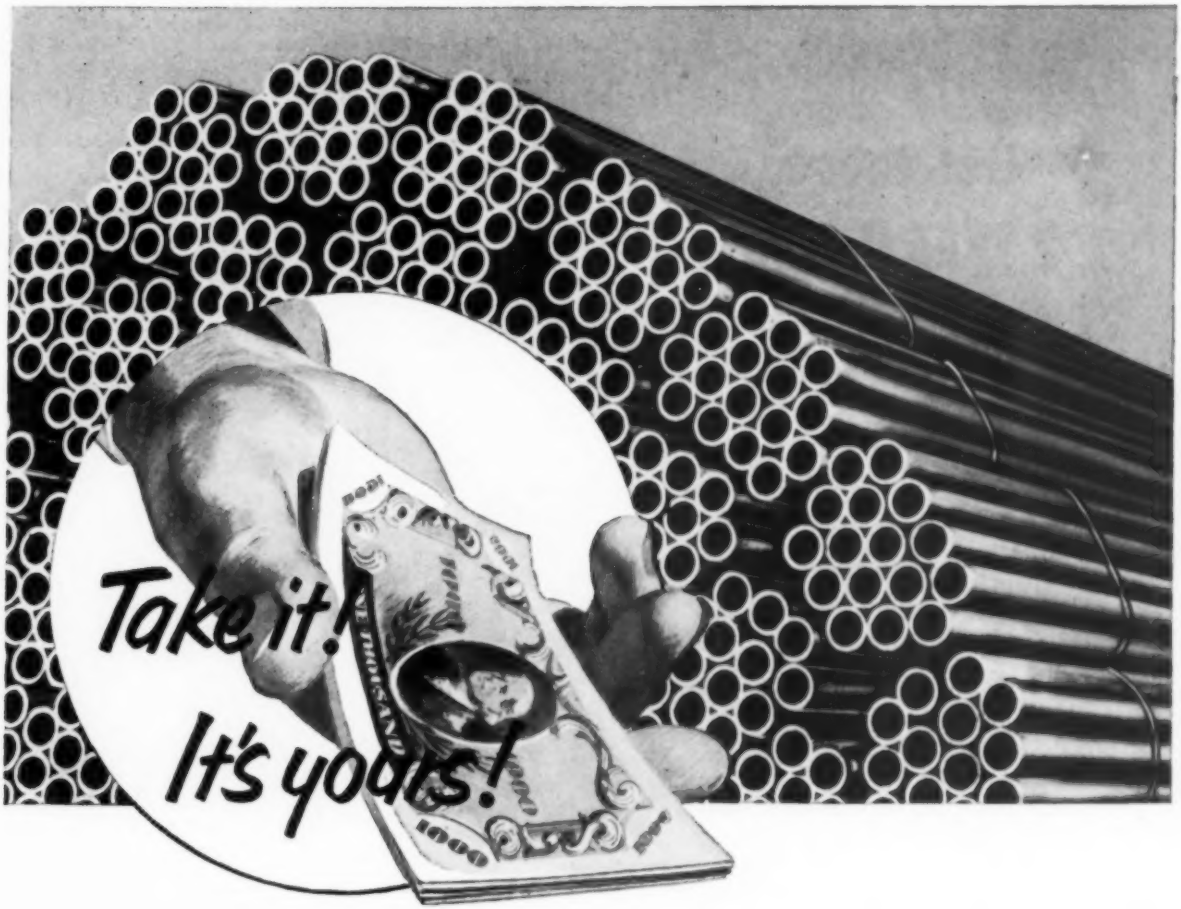
SAMUEL G. HARRIS has been named district engineer at TULLAHOMA, TENN., for the Aeronautical and Special Products Division of HAGAN CORPORATION, Pittsburgh, Pa.

Hagan is designing and building large instrument control facilities for the Air Force's giant new Arnold Engineering and Development Center at Tullahoma, and is engaged in similar projects at the Engine Test Laboratory at Wright-Patterson Air Force Base, the Navy's Aeronautical Engine Test Laboratory at Trenton, N. J., and the Willgoos Engine Test Facility of Pratt & Whitney Division, United Aircraft Corporation.

Blackmer Pump Co.—Dallas

RALPH THORNBURG has been appointed Division Sales Manager of the South Central Division for BLACKMER PUMP COMPANY of Grand Rapids, Michigan.

Mr. Thornburg has a well-rounded experience with pumping equipment, having been formerly associated with Yale and Towne Manufacturing Company, where he was sales manager of the Pump Division, and most recently with Marlow Pumps as their Eastern District Manager. He is a graduate



Your sound judgment has paid off!

You've earned thousands of dollars in savings by using the right tubing for your particular installation. And you got the right tubing when you called on NATIONAL before you bought.

We've been in the tubing business for over sixty years. In fact we're the world's largest manufacturer of tubular steel products. It's pretty obvious, then, that over the years we've had a chance to analyze thousands of tubing installations. We've run up against just about every tubing problem in the book, and we've kept records of our findings. We call these records our "experience file." Our recommendations from this file are available to you at any time—at no cost. And they may save you thousands of dollars.

If you are having trouble with corrosion, high pressures, heat or exposure, give us a chance to help you the next time you're ready to order tubing. Your problem may be a new one to you, but there's a pretty good possibility that we've encountered it before and have the answer to it. So consult NATIONAL first. Bring your tubing problems *home*—to "Tubing Headquarters." For complete information, write to National Tube Division, United States Steel Corporation, 525 William Penn Place, Pittsburgh 30, Pennsylvania.

NATIONAL TUBE DIVISION, UNITED STATES STEEL CORPORATION, PITTSBURGH, PA.
(Tubing Specialties)
COLUMBIA-GENEVA STEEL DIVISION, SAN FRANCISCO, PACIFIC COAST DISTRIBUTORS
UNITED STATES STEEL EXPORT COMPANY, NEW YORK

U·S·S NATIONAL *Seamless* PIPE AND TUBES

USS

UNITED STATES STEEL

Make AIR an ASSET

Get these 2 FREE Catalogs

Investigate the advantages of air in motion!

Cool, clean air builds efficiency and makes ventilation an asset, not a problem. Stores, offices, institutions and factories everywhere have found the installation of Emerson-Electric Exhaust Fans and Air Circulators the ideal way to improve employe efficiency, and to build good will with the people they serve.

If you wish to learn about the benefits of proper ventilation, write today for these two catalogs. They include plans for effective fan installations, plus complete information on both types of fans.

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FREE—Without obligation, send me the Emerson-Electric Catalog(s) checked:

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COMPANY .....

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EMERSON ELECTRIC
FANS • MOTORS APPLIANCES

of the University of Oklahoma and previously attended Drake University at Des Moines, Iowa. Mr. Thornburg will maintain his residence and offices in Dallas, Texas.

Westinghouse Lamp Div., SE

Two appointments were made recently by the WESTINGHOUSE LAMP DIVISION, Bloomfield, N. J., it was announced by R. A. CORVEY, Southeastern District Manager.

James D. Poage

JAMES D. POAGE was named as Central Station Manager for the Southeastern District and will be in charge of utility accounts. Mr. Poage has been with the Lamp Division for the past four years as a Lamp Application Engineer. He was formerly connected with the Georgia Power Company in Atlanta.

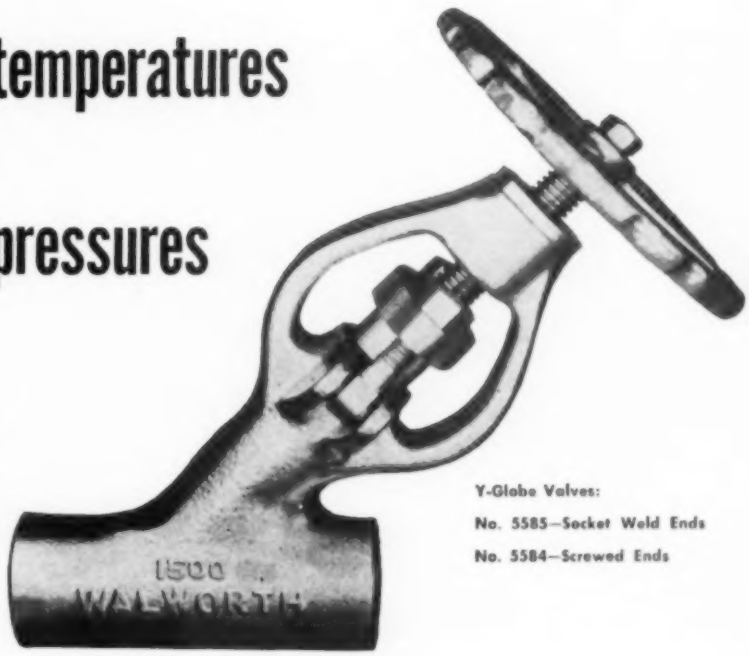
John F. Baker

JOHN F. BAKER was appointed Assistant District Engineer, reporting to J. D. MITCHELL, Southeastern District Engineer. Mr. Baker was formerly a product specialist in the Commercial Engineering Department at the Division's headquarters, and since 1950 has been a Lamp Application Engineer in the Southeastern District.

Walworth's NEW small cast steel valves

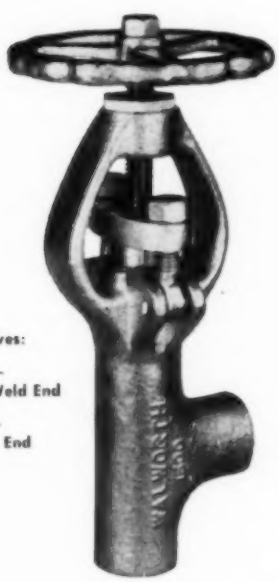
SERIES 1500 — SIZES ¼ to 2 inches

handle HIGH temperatures
HIGH pressures



Y-Globe Valves:
No. 5585—Socket Weld Ends
No. 5584—Screwed Ends

Walworth is proud to make these new Small Cast Steel Valves available to power stations . . . oil refineries . . . ships . . . wherever piping is subject to severe pressures and temperatures. Non-shock service ratings of these valves: 1500 psi–950F for steam; 3600 psi–100F for water, oil or gas. Cast of chromium molybdenum steel, they are compact and light, yet exceptionally strong. Both Y-Globe and Angle type valves are available.



Angle Valves:
No. 5587—
Socket Weld End
No. 5586—
Screwed End

Simplified Walworth design eliminates many of the valve problems encountered in high pressure service. Among the features of this new valve are:

INTEGRAL BODY AND YOKE – made from a single casting without threading or welding. Bonnet joint — always a potential source of leakage — is eliminated. Valves can be reassembled quickly and easily.

ROTATING DISC – prevents valve seat distortion and consequent leakage. Cuts down replacements.

WELDED SEAT RING – compensates for changes in pressure and temperature—eliminates a major source of leakage.

SPECIAL BACK SEAT BUSHING – permits repacking the valve under pressure with greater safety.

PACKING CHAMBER – designed to dissipate heat thus keeping packing rings at lower temperatures—gives them longer life.

These valves are available with either socket weld ends or screwed ends, in sizes ranging from ¼ to 2 inches. For further information on Walworth series 1500 Small Cast Steel Valves, see your local Walworth distributor, or write for Circular No. 134.

WALWORTH

valves • fittings • pipe wrenches

60 EAST 42nd STREET, NEW YORK 17, N. Y.

DISTRIBUTORS IN PRINCIPAL CENTERS THROUGHOUT THE WORLD

Halifax Paper Co.—N. C.

Expansion of the HALIFAX PAPER COMPANY'S ROANOKE RAPIDS plant in NORTH CAROLINA has been completed, according to the engineer-constructor, THE RUST ENGINEERING COMPANY of Pittsburgh and Birmingham, Ala. Cost of the project was $5,800,000.

The new addition augments the plant's existing facilities for the production of unbleached kraft paper. The project included construction of a two-story building to house a new 246 in. paper machine and its necessary stock preparation equipment, as well as additional finishing and shipping facilities, a high density pulp storage tower, and a 6,000,000 gallons per day water treatment plant.

The new Fourdrinier paper machine can operate up to speeds of 2,500 fpm. Its forming wire is 130 ft long. The machine comprises 33 paper driers, two felt driers (60 in. in diameter; able to withstand 125 psi pressure), latest type press section, pressure type head box, a six-roll calendar stack, breaker stack, Beloit mechanical sectional drive, mechanical reel puller, and a Jamar Olmen ventilating system.

Necessary alterations were also made to the existing paper mill in order to integrate its production with the new addition. The new building was designed to permit installation of a second large paper machine at a later time in the most economical way without interrupting or slowing down mill operations.

5 REASONS WHY...

BLAW-KNOX ELECTROFORGED® GRATING IS YOUR BEST BUY

—►STRENGTH
—►SAFETY
—►LOW UPKEEP
—►LONG LIFE
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We factory-fit this one-piece Open Steel Flooring to your dimensions for easy installation. You can cover dangerous open areas and add useful space inside and out.

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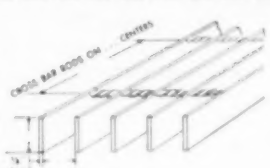

Please send prices on ..... sq. ft. Grating as per specifications marked at right.
Please send prices on ..... Type ..... Stair Treads ..... inches wide.
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INDIVIDUAL _____
STREET _____
CITY _____ ZONE ____ STATE _____

BLAW-KNOX ELECTROFORGED STEEL GRATING

Cooling Tower Institute

LEON T. MART, president of THE MARLEY COMPANY, KANSAS CITY, MO., was elected president of the COOLING TOWER INSTITUTE at the annual meeting. Other officers elected for the 1953 terms were Neal B. LauBach of Hudson Engineering Corp. of Houston, vice-president; Paul R. Hoffmann of Lilie-Hoffmann Cooling Towers of St. Louis, secretary; Clayton E. Pickup of The Fluor Corporation, Los Angeles, treasurer. Executive offices of the Institute at Palo Alto, California, continue under the direction of Raymond C. Kelly, executive manager.

Leon T. Mart

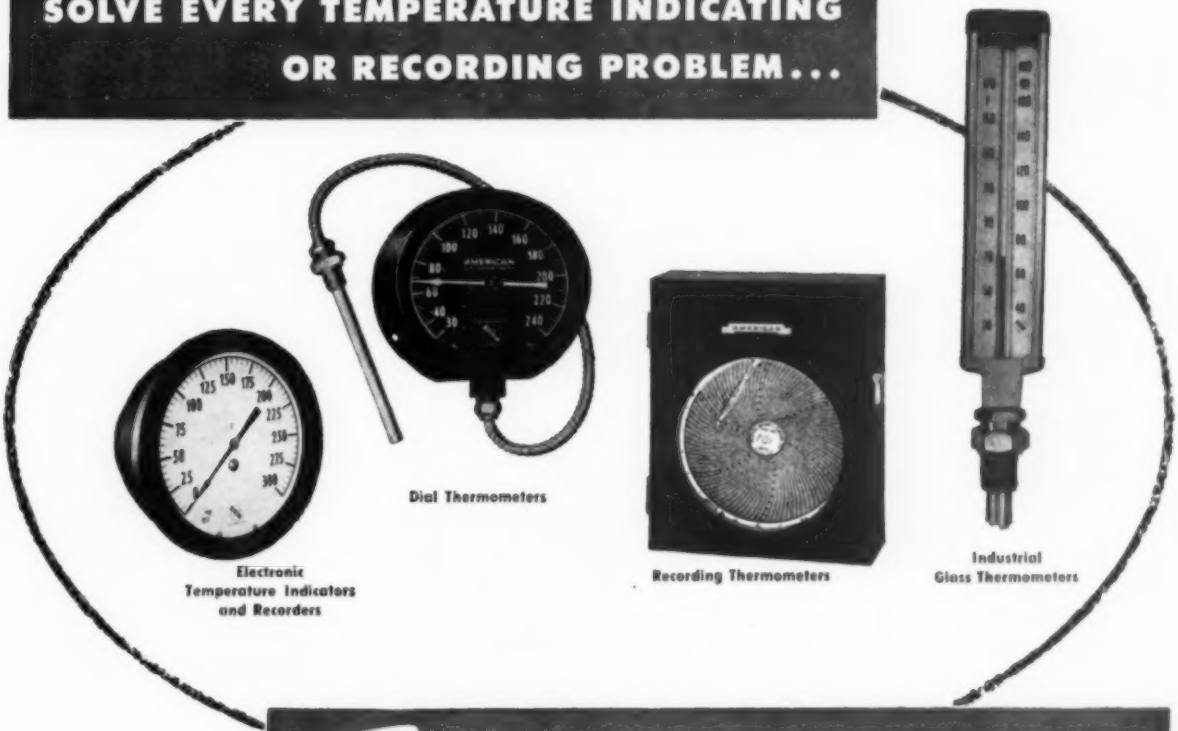
Allis-Chalmers—Florida

THE R. & R. SUPPLY CO., INC., 531 W. Central Ave., Orlando, has been named a distributor for ALLIS-CHALMERS pumps in portions of FLORIDA.

Area served by the new distributor is south of and including the counties of Alachua, Putnam and St. Johns; north of and including Highlands, Okeechobee and St. Lucie counties, and east of and including Marion, Lake and Polk counties.

The R. & R. Supply Co. is headed by H. T. CLAIBORNE.

SOLVE EVERY TEMPERATURE INDICATING OR RECORDING PROBLEM...



Electronic Temperature Indicators and Recorders

Dial Thermometers

Recording Thermometers

Industrial Glass Thermometers

Specify AMERICAN THERMOMETERS

Maintenance of product quality . . . precise cost control . . . protection of equipment. For whatever reason consistently accurate temperature indication or recording is vital to your operations, choose the best — American Thermometers and Temperature Measuring Instruments.

Unlimited application — determined by the type of instrument and requirements — is evident in the following broad specification information:

TEMPERATURE RANGES: Minus 100°F. to plus 3000°F.

TYPES OF ACTUATION: Mercury, vapor pressure, gas, bi-metal and thermocouple.

REMOTE INDICATION OR RECORDING: For measurements up to 250 feet from the temperature source, accurate mercury-actuated instruments are available with famous "Magic Pulse" self-compensating capillary tubing. To indicate or record process temperatures at one or more points a considerable distance from the temperature source, American Temperature Transmission Systems provide maximum accuracy.

Materials of the highest quality, advanced design, and precision workmanship assure perfect performance in the severest applications. The wide variety of types, temperature ranges, and means of actuation make it easy to select the proper American Thermometers and Temperature Measuring Instruments for your specific needs. Write for catalog.

FOR THE BEST SERVICE, buy through your Industrial Supply Distributor. He has the experienced organization and carries adequate stocks to meet your most exacting requirements and at low cost.

AMERICAN INDUSTRIAL INSTRUMENTS

A product of **MANNING, MAXWELL & MOORE, INC.** STRATFORD, CONNECTICUT

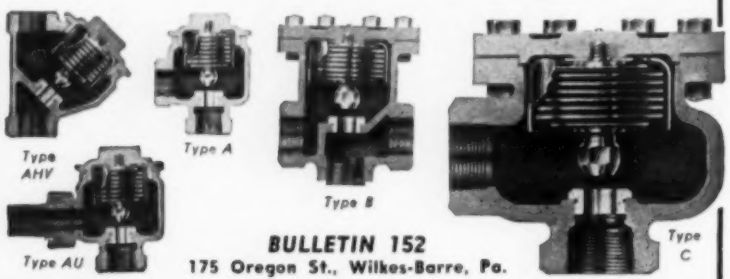
MAKERS OF 'AMERICAN' INDUSTRIAL INSTRUMENTS, 'HANCOCK' VALVES, 'ASHCROFT' GAUGES, 'CONSOLIDATED' SAFETY AND RELIEF VALVES, AIRCRAFT PRODUCTS. BUILDERS OF "SHAW-BOX" AND 'LOAD LIFTER' CRANES, 'BUDGIT' AND 'LOAD LIFTER' HOISTS AND OTHER LIFTING SPECIALTIES.

NICHOLSON TRAPS

SAVE CAR OF COAL WEEKLY

for This Large Steam User

Following replacement of all steam traps of various makes, with Nicholson units, an Eastern college reports:—"An average coal saving of 1 carload per week besides much better heat distribution". Credit is given the higher and more even temperatures which Nicholson traps effect. See why large industrial and institutional steam users are increasingly standardizing on Nicholsons. 5 types; for heat, power, process; sizes 1/4" to 2"; pressures to 250 lbs.



BULLETIN 152
175 Oregon St., Wilkes-Barre, Pa.

W. H. NICHOLSON & CO.

TRAPS · VALVES · FLOATS

Tubes

BOILER TUBE CO. OF AMERICA

McKEES ROCKS, PA.
(Pittsburgh District)

PITTSBURGH • CHICAGO • FRED S. RENAULD & CO., LOS ANGELES

news (continued)

Cleco Promotes Donohue

CLECO PNEUMATIC TOOL DIVISION of the REED ROLLER BIT COMPANY, P. O. BOX 2119, HOUSTON, TEXAS, recently announced the promotion of T. E. DONOHUE to the position of Cleco Sales Manager, following the resignation of W. J. VOSSBRINCK, former Sales Manager, who will leave the company's employ to form his own firm.

T. E. Donohue

Donohue began his career in the air tool field in 1925 immediately following his graduation from LaSalle Academy. After twenty-two years in air tool sales promotion work, he joined Cleco in 1948 as Assistant Sales Manager.

VEPCO Elects Officers

Following a meeting of the board of directors of the VIRGINIA ELECTRIC AND POWER COMPANY in Richmond, President Jack G. Holtzclaw announced the election of two new vice-presidents, TOM D. FULFORD, formerly general sales manager, as vice president in charge of Sales for the System, and WALTER I. DOLBEARE, formerly director of industrial development, as vice president in charge of Area Development. All other officers of the company were re-elected.

Mr. Fulford joined the Vepco organization in 1926 as division sales manager in Norfolk. Since 1937 he has been in charge of Sales throughout the Vepco system.

Mr. Dolbeare has been associated with Vepco since 1927 when he joined the company as illuminating engineer and during the past 25 years has served in various capacities in sales work and as manager of the former Williamsburg and Suffolk districts of the company, and in recent years as director of industrial development.

Robertson Joins Wysong

WYSONG AND MILES COMPANY of GREENSBORO, N. C., builders of metal working machinery have announced that O. R. ROBERTSON has joined their engineering staff.

Mr. Robertson is a native of Raleigh, N. C. He comes to Wysong from Western Electric's electronics plant in Winston-Salem.

O. R. Robertson

Robertson graduated from Campbell College and attended North Carolina State College. He has been in the engineering field for 12 years. Before joining Western Electric he was employed in the engineering departments of Wright Machinery Company of Durham, N. C., and Fairchild Aircraft Corporation at Hagerstown, Md.

Reliance Electric, Baltimore

Establishment of a new branch office in BALTIMORE, MD., by the RELIANCE ELECTRIC & ENGINEERING COMPANY, Cleveland, O., manufacturers of motors and motor-drives, was recently announced.

The new branch office, located at 13 West 25th Street, Baltimore, enables the company to broaden the availability of sales application and technical engineering service to users of a-c and d-c motors, adjustable-speed drives, gearmotors and related electrical equipment in the tri-state area embracing South Central Pennsylvania, Maryland and Virginia.

The office is staffed by A. C. SCHETTLER and W. C. MITCHELL, sales engineers.

Petrochemical Plant—Texas

The first unit of the Williams Plant of KOPPERS COMPANY, INC., at PORT ARTHUR, TEXAS, was recently dedicated. Begun in mid-1951, the plant was designed and erected by Koppers Engineering and Construction Division. Partial production began in mid-1952 with full production attained in March, 1953.

The new installation combines ethylene gas obtained through a pipeline from the nearby refinery of the Gulf Oil Corporation with benzene to make ethylbenzene. Ethylbenzene in turn is shipped to the Kobuta Plant of Koppers Chemical Division near Monaca, Pa., where it is converted into styrene monomer which is an intermediate material in the production of synthetic rubber and other resins and in the production of Polystyrene plastics.

New Rockwell Plant—Texas

ROCKWELL MANUFACTURING COMPANY, 400 N. Lexington Ave., Pittsburgh 8, Pa., will open a new valve and meter plant in SULPHUR SPRINGS, TEXAS, during the latter part of the year.

The plant, representing an investment of several million dollars, and now under construction, will be devoted largely to production of Nordstrom valves—particularly 4-in. and smaller steel Hypreseal valves in every pressure range.

The new factory is being established to serve the entire South and Southwest and a large part of its output will go to oilfields in Texas, Oklahoma, Louisiana and Mississippi.

Castings will be shipped to the plant from outside sources of supply, and all machining and assembling will be performed at the plant.

The company's long-range plans for the plant include production of various valves, meters and perhaps other products. All research, development and engineering work on the 4-in. and smaller Hypreseal valves will be conducted at the plant.

P. E. W. GOODWIN, JR., of Oakland, Calif., manager of outside manufacturing facilities for the company since January, 1952, has been named manager of the new plant.

P. E. W. Goodwin, Jr.

International Nickel, W. Va.

L. E. GRUBB, former General Superintendent of Inco's Bayonne, N. J., Works, has been appointed General Superintendent of the HUNTINGTON, W. VA., Works of THE INTERNATIONAL NICKEL COMPANY, INC. At the same time, P. H. Flynn, who had been Assistant Superintendent of the company's Bayonne, N. J., Works, was named General Superintendent succeeding Mr. Grubb.

Wrought Iron in Carolina Sewage Plant

Rotary distribution lines are included among important piping services that are vulnerable to aggressive elements of corrosion in sewage plants. At the new sewage treatment plant, City of Hartsville, S. C., engineers Barber, Keels & Associates, Columbia, S. C., specified wrought iron for spray piping to protect these rotary arms of the trickling filter against early failure due to corrosion. Identical specifications safeguard sludge sampling lines and gas piping. Coulter & Company, Columbia, is the contractor.

news for the South and Southwest *(continued)*

NOPSI Elects Officers

The Board of Directors of NEW ORLEANS PUBLIC SERVICE INC. has elected as Vice Presidents of the Company, CLAYTON L. NAIRNE and LIONEL J. CUCULLU.

Mr. Nairne, a native of New Orleans, attended Rugby Academy and was graduated from Tulane University's College of Engineering. He was first employed by Public Service as a student engineer in 1924. In 1928, after three years' experience as an engineer with Florida Power & Light Company, he rejoined Public Service. After serving in various capacities, he was named Assistant to the Vice President in charge of Operations. In 1951 he became General Superintendent of Operations, being charged with responsibility for the operations of the Electric, Gas, and Transit Departments.

Mr. Cucullu, also a native Orleanian, was graduated from Louisiana State University in Engineering. He joined the Company as sales engineer in 1930, following three years of experience with other organizations. He became Chief Engineer in 1951.

Lionel J. Cucullu and Clayton L. Nairne now Vice Presidents of New Orleans Public Service, Inc.

Flintkote Names Dill—La.

THE FLINTKOTE COMPANY, 30 Rockefeller Plaza, New York 20, N. Y., has announced the appointment of CHARLES E. DILL to represent its Industrial Products Division sales organization in the Southern Division with headquarters at the company's New Orleans plant.

Mr. Dill was formerly connected with the Flintkote Research Laboratory at Whippany, N. J., as a product technical adviser and development engineer.

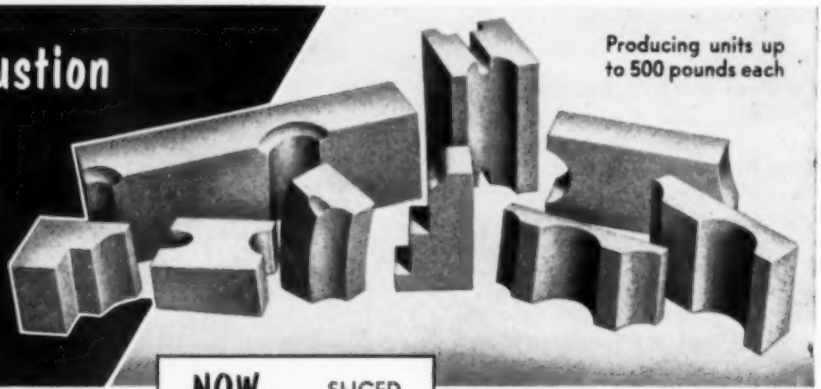
Westinghouse Discontinues Stoker Manufacture

WESTINGHOUSE ELECTRIC CORPORATION is leaving the industrial stoker manufacturing field. Arrangements have been made for renewal parts and stoker service to be supplied by the DETROIT STOKER COMPANY of Monroe, Michigan, it was announced recently by J. K. Hodnette, Westinghouse vice-president.

Marley Company—Houston

THE MARLEY COMPANY, 222 West Gregory Blvd., KANSAS CITY, MO., manufacturer of water cooling towers, announces the new location of its HOUSTON, TEXAS, sales office at 1601 Commerce Building. ROY W. MAZE is Gulf Coast manager.

Leading Combustion Engineers use IRONTON SPECIAL SHAPES



Producing units up to 500 pounds each

In two great new Carolina Power and Light plants, the special shapes for boiler installations are **Ironton Kentucky Clay Refractories.** These custom-made units meet specifications of Combustion Engineering — Superheater, Inc. and other industry experts who demand:

- **ACCURACY IN DIMENSIONS**
- **HIGH P. C. E. CLAYS**
- **MIXES FORMULATED** to fit service requirements
- **CLOSE SUPERVISION** of shape manufacture. We will gladly supply technical data and test samples. Write or call today.

NOW . . . SLICED for easy handling
IRONTON NOJOINT
the plastic refractory for built-to-fit BOILER SETTINGS and FURNACE LININGS

Call Ironton's representative in the nearest Southern city

Baltimore, Md., MUlberry 7184
Charlotte, N. C., Phone 55-285
Chattanooga, Tenn., Phone 7-6697
Jacksonville, Fla., Phone 3-5586
Miami, Florida, Phone 82-5782

RELIABLE REFRACTORIES

THE IRONTON FIRE BRICK COMPANY
IRONTON, OHIO

Safety Seal Names Wilson

W. A. WILSON, 4801 Dodd Drive, CORPUS CHRISTI, TEXAS, is the newly appointed South Texas sales representative for SAFETY SEAL PISTON RING COMPANY, Fort Worth, Texas, manufacturers of industrial piston rings. Mr. Wilson was formerly factory superintendent with Safety Seal, and he has had twenty-eight years of experience in the manufacture and application of industrial piston rings.

Cleco—W. Va., Ark., La.

THE CLECO DIVISION of the REED ROLLER BIT COMPANY, HOUSTON, TEXAS, has announced the appointment of: A AND I SUPPLY COMPANY, 614-616 Virginia Street, West, CHARLESTON, WEST VIRGINIA; LYONS MACHINERY COMPANY, 904 Broadway, LITTLE ROCK, ARKANSAS; and EQUITABLE EQUIPMENT CO., INC., 410 Camp Street, NEW ORLEANS 12, LOUISIANA, as distributors for Cleco products in their areas.

AIEE Elects Robertson

Election of ELGIN B. ROBERTSON as 1953-54 President of the AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS was announced at the Summer General Meeting in Atlantic City.

Mr. Robertson, who is president of Elgin B. Robertson, Inc., DALLAS, TEXAS, is a member of the Institute Board of Directors and has been active in affairs of the Institute.

At the same time, announcement was made of the election of five vice presidents. These included C. P. ALMON, JR., Tennessee Valley Authority, CHATTANOOGA, TENN., Southern District.

Griffith of G.E. Dies

R. S. GRIFFITH, manager of electric utility sales, Southeastern District, GENERAL ELECTRIC COMPANY, ATLANTA, GA., died suddenly on May 27 during a visit to Keystone Heights, Florida.

Mr. Griffith had been associated with G.E. for more than 34 years. A graduate of Georgia Tech, he joined the company on Test in 1919, and the following year he moved to the Birmingham office.

In 1924 he was assigned to the Central Station Department, and went to Atlanta as manager of the department in 1932.

Okadee
"THE PERFECT SEAL"
WRING FIT

No magic... No magnetism... lapped wring fit of every Okadee Valve disc and seat must pass this test of a perfect sealing surface. (unretouched photo)

...Here's What it Means to You in Terms of Valve Service

Flat mating surfaces within .000005", or less, of every set of Okadee valve discs and seats mean absolute shut-off of any material from ammonia gas to asphalt.

How long does this seal last in service? We honestly don't know. Tests under working conditions with propane were stopped after 269,000 operating cycles when no wear or seal failure could be detected. And Okadee valves do not have to be babied in service on corrosive or abrasive materials . . . Thousands of boilers have had Okadee blow-down valves in continuous, trouble-free service for fifteen years or more. If Okadee size-pressure-temperature ranges include your valve applications, Okadee installation will end your problems of valve performance once and for all.

Okadee valves are available in single-disc (one direction) and double-disc (two directions) types; screwed or flanged; ½" to 6" in standard A.S.A. dimensions; steel or semi-steel bodies (other materials to order); stainless steel or stellite seat facings; levers, rack-and-lever, worm-gear, hydraulic, pneumatic, automatic on-off control.

Write for Bulletin 332-H today!

OKa. Okadee COMPANY
332 South Michigan Avenue • Chicago 4, Illinois

Highlight Report on The Basic Materials Conference

(*Starts on page* 54)

as to give them structural value up to 2000 F. Scaling is a deterring factor, and practical use awaits the development of a satisfactory protective coating of fool-proof quality. Nickel and inconel clad coatings show promise of giving useful protection. Vapor phase coating with silicon, followed by a diffusional treatment, is another experimental approach to protecting molybdenum alloys from high-temperature oxidation.

Zirconium—When free from all but a trace of hafnium, this metal is well suited as a structural material for nuclear reactors, characterized as it is by a very low neutron cross section.

Hafnium—By-product of high-purity zirconium production, this metal has a high resistance to tarnishing and takes a high polish—which suggests possible applications for the jewelry industry.

Plastics—Plastic materials of exceptional structural adhesive value are being widely accepted. Fiber (glass, nylon, etc.) reinforced plastics are finding use in such applications as body armor for the military, auto body parts, and helicopter blades (in sandwich construction with balsa).

Polyester and phenolic resins are widely used in the manufacture of low and high-pressure laminate materials respectively, some of the latter developing up to 50,000 psi tensile strength. Fluorocarbon (thermoplastic) and silicone (thermosetting) resins are capable of useful service to 600 F; the latter, unfortunately, is characterized by a long curing time.

New or improved electrical insulators made of plastic materials include Teflon, Kel-F, and polystyrenes. Insulating qualities of plastic materials are adversely affected (resistivity is lowered) at least temporarily, by exposure to penetrating radiation.

Specification and Utilization

Materials' development must be accompanied by proper use of those materials; a responsibility which the engineer must assume.

By way of definition: A **specification** is a description of material required. A **standard** is a widely adopted specification. Simplification pertains to the reduction of the number of standards to a minimum.

By way of an example of simplification: By careful analysis of its standards, the Ford Motor Company has been able to very significantly reduce the number of flat steel stock thicknesses used; a simplification resulting in reduced costs and facilitated procurement of material. Incidently, Ford specifies thickness in decimals of an inch and not by gage number, thus eliminating confusion arising from the several gage systems in existence.

RODA — High grade gas, by-product, steam and household stoker coal from Wise County, Virginia, on the Interstate Railroad.

KENDRICK — High grade gas, by-product, steam and domestic coal from Wise County, Va., on the Interstate Railroad.

STONEGA — High grade, high volatile steam and by-product coal from Wise County, Va., on the Interstate Railroad.

GLENBROOK — The Premium Kentucky High Splint unmatched for domestic use. Produced in Harlan County, Kentucky, on the L. & N. Railroad.

COKE — Roda and Stonega from Wise County, Va.

CRITERION COAL — High grade gas, by-product, steam and domestic coal—Pittsburgh seam from Irwin Basin, Westmoreland County, Pennsylvania, on the Penna. Railroad.

HAMPTON COAL — High volatile domestic, steam and by-product coal from Boone and Logan Counties, W. Va., on the Chesapeake & Ohio Ry.

CROZER — Genuine Pocahontas from McDowell County, W. Va., on the Norfolk & Western Railway.

LYNCO — High fusion coking coal for by-product, industrial stoker and pulverizer use from Wyoming Co., W. Va., on the Virginian Ry.

ANTHRACITE

Hazel Brook—*Premium Lehigh*
Raven Run—*Premium Mahanoy*
Cross Creek—*First Grade Lehigh*

Our engineering service, available upon application, and long and varied experience is your assurance of the Right Coal — Properly Applied.

General Coal Company

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CABLE ADDRESS, GENCO

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BLUEFIELD, W. VA. BUFFALO CHARLOTTE, N. C. CINCINNATI
CLEVELAND IRWIN, PA. NEW YORK NORFOLK

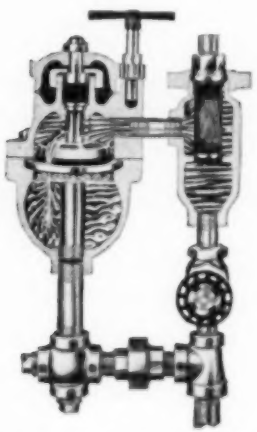
Equipment and Supplies

(*Starts on page 8*)

a wide range of fuels, from gasoline to number two diesel fuel without changing orifices or burner parts. Another feature results in substantial fuel savings by trapping radiated burner heat to raise the water temperature 50 degrees before it enters the heating coil. Other automatic controls safeguard the new steam cleaner by turning off the burner if water supply fails, and by preventing the burner from being fired unless pump is in operation.

Continuous Boiler Blow-Off Without Excessive Heat Waste

H-8 MADDEN CORPORATION, 1543 Morse Ave., Chicago 26, Ill., is offering a new orifice meter featuring a system of continuous boiler blow-off that provides safe removal of boiler water impurities without unnecessary heat waste.



Connected at the surface, the Madden flow control unit continuously drains the proper amount of water from the area of greatest concentration of impurities.

The object of the system is to continuously remove high percentage of the foreign solids present in all waters, and which tend to accumulate in boilers because of the evaporative process. The orifice meter is intended to maintain this accumulation efficiently yet economically at a safe level below the critical point at which wet steam and priming develop.

Heart of the system is the orifice plate with 17 calibrated orifices. These openings are graduated in size to permit selection of the proper orifice for any operating condition likely to be encountered.

Spherically ground Dart seats say "no" to leaks as long as in service — and as often as piping is changed. Darts can be taken off the line and used elsewhere time and time again. That's economy! What's more, the tight seal comes easily without heavy wrenching or strain.

QUICK FACTS

- Two bronze seats provide top resistance to pitting and corrosion
- Heavy shoulders can withstand the strongest yanks of the wrench
- Nut and body of air-refined, high test malleable iron are practically indestructible
- Threads are full and clean-cut of hard metal to prevent stripping

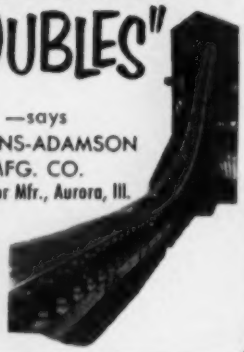
Experience proves that the men who *buy* Darts, the men who *use* Darts and the men who *sell* Darts have "something special"!

DART UNION COMPANY
Providence 5, Rhode Island
The Fairbanks Co. — Distributors
Boston•New York•Pittsburgh•Rome, Ga.

DART UNIONS

"NO MORE LUBRICATION TROUBLES"

—says STEPHENS-ADAMSON MFG. CO.
Conveyor Mfr., Aurora, Ill.



"LUBRIPLATE Lubricants satisfy the 'one-shot' requirements of our conveyor idlers. LUBRIPLATE effectively lubricates each bearing in turn and flows through the hollow shaft to the next bearing. We do not know of a single case of bearing trouble through faulty lubrication where LUBRIPLATE has been used."

For nearest LUBRIPLATE distributor, see Classified Telephone Directory. Send for free 56-page "LUBRIPLATE DATA BOOK"... a valuable treatise on lubrication. Write LUBRIPLATE DIVISION, Fiske Brothers Refining Co., Newark 5, N. J. or Toledo 5, Ohio.

REGARDLESS OF THE SIZE AND TYPE OF YOUR MACHINERY, LUBRIPLATE LUBRICANTS WILL IMPROVE ITS OPERATION AND REDUCE MAINTENANCE COSTS.

new equipment (continued)

For more data circle item code number on the postage free post card—p. 17

Back-up Rings for Shaft Mechanical Seals

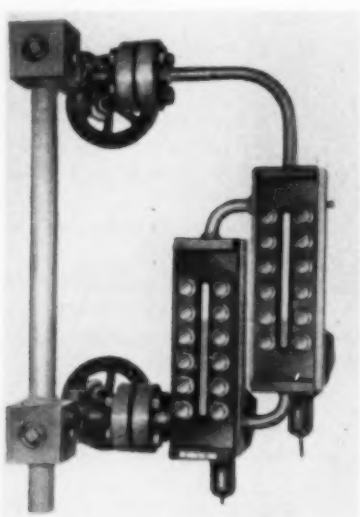
H-9 THE GARLOCK PACKING COMPANY, Palmyra, N. Y., has introduced back-up rings, spirally machined of Tetrafluoroethylene (Du Pont's Teflon), designed to prevent extrusion of "O" rings.

Teflon back-up rings are designed for Garlock Packing Company's "O" ring seals which provide leakless operation of rotary shafts on centrifugal pumps handling chemicals, petroleum products, edible liquids, pulp liquors, etc.

The "Teflon" rings have a high impact strength at temperatures from —100 F to 500 F; are non-corrosive, non-adhering, non-fraying, inert to most chemicals and self-lubricating. They are made for all "O" ring sizes to AN drawings 6227 and 6230.

Water Gage Assembly

H-10 YARNALL-WARING COMPANY, Chestnut Hill, Philadelphia 18, Pa., has introduced a new separated-design water gage assembly with gage glass inserts of the Yar-

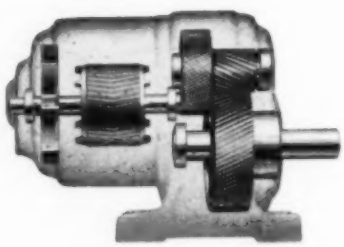


Yarnall-Waring's new separated-design flat glass boiler water level gage assembly.

Slo-Speeds Improve Paint Quality

Vertical, face mounted Slo-Speeds on our 300-gallon paint mixing vats have improved product quality, reduced production costs and decreased maintenance. Slo-Speeds require less space, provide greater safety, permit lower cost installation, and give us the exact low speed for our requirements in a single, compact, quiet, rugged unit, reports J. E. Gauntt, of Stebbins & Roberts, Inc., Little Rock, Ark.

STERLING SLO-SPEED



OUTSTANDING FEATURES:

Simplified gear system — balanced design — compact — rugged — highly efficient — abundant lubrication — low output shaft — positive oil seals — Herringbone Rotor — protected — streamlined — direct through ventilation — quiet operation — AGMA speeds — extremely long life — every unit will operate in any position.

20-page illustrated catalog... Sterling Speed-Trol, Slo-Speed, Klosd and Klosd-Tite Electric Power Drives. Write for catalog No. 1-D-433

STERLING ELECTRIC MOTORS

Plants: New York City 51; Chicago, Ill.; Los Angeles 22; Hamilton, Canada; Santiago, Chile
Offices and distributors in all principal cities

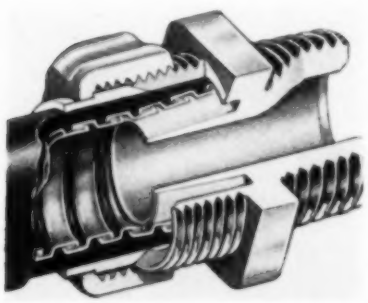
way pressure-sealed "floating assembly" type.

On gages for wide range of visibility greater flexibility is gained by using two independent inserts, and by interconnecting expansion loops. On gages for medium ranges, using one insert, a single expansion loop is used.

The lower flanged connection and the upper flanged loop connection result in the elimination of stuffing boxes. The short lower flanged connection eliminates the cold water leg, resulting in greater accuracy in level reading. The tie-bar-type water column linking the gage valves provides circulation to keep gage nearer drum temperature. Yarway Type "M" Illuminators may be used on these separated-design gages.

Flexible Conduit Fitting

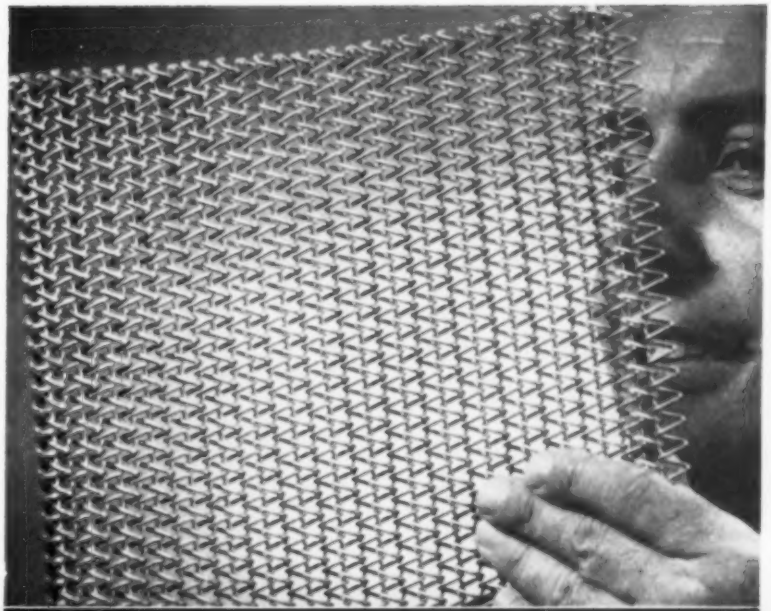
H-11 THE THOMAS & BETTS CO., Elizabeth, N. J., has developed a new fitting for liquid-tight flexible conduit which mates with any conduit spiral and doesn't have to be taken apart when installed.



Cutaway view of the new Thomas & Betts fitting for liquid-tight flexible conduit shows how conical-shaped ground mates with any conduit spiral by simple wedge action. Fitting is recommended for machine tool wiring or other similar electrical circuits exposed to corrosive liquids and mineral oils.

The fitting is said to be ideal for machine tool wiring or other similar electrical circuits exposed to corrosive liquids and mineral oils. It is made in straight, 90-degree and 45-degree elbow designs and accommodates conduit from ⅜ to two inches trade size. The new design was developed with the cooperation of the Metal Hose Division, American Brass Co.

Another advantage claimed for the fitting is the fact that only one wrench size is needed for the gland and the body. A color coded plastic seal in the gland indicates a fitting's size and the fact that it is a liquid-tight type.



NO ODORS!

proves Cambridge

WOVEN WIRE CONVEYOR BELTS

best for food plants

No odor to the belting! And the open mesh metal belt can't pick up food odors or become clogged with food particles. Your product leaves the belt free from odor contamination.

That's just one reason why WOVEN WIRE Conveyor Belts are superior to solid types of belting for food processing. Stainless steel, widely used throughout the food industry, further assures freedom from contamination by giving lifelong rust protection. Open mesh permits free drainage of wash or cooking solutions . . . free circulation of hot or cold air during cooking or cooling. And you can steam clean or wash the all-metal belt as often as you like without damage.

No matter how you look at it, the best all-around conveyor belting for food processing is WOVEN WIRE . . . by Cambridge. Available in any size, mesh or weave, and in any metal or alloy. Your Cambridge Field Engineer can recommend the best type of woven wire belting for your plant. Write direct or look under "Belting-Mechanical" in your classified phone book for the Cambridge man nearest you.

VEGETABLE PACKER COMBINES MOVEMENT WITH PROCESSING . . . by using a Cambridge *Woven Wire* Conveyor Belt to carry fresh carrots through washing and sorting. Moving belt carries carrots continuously past sorting stations. Open mesh of woven wire construction allows free drainage of wash water and dirt.

FREE CATALOG gives conveyor belt design and applications in food plants.

The Cambridge Wire Cloth Company

WIRE CLOTH | METAL CONVEYOR BELTS | SPECIAL METAL FABRICATIONS

Department Y
Cambridge 8, Maryland

OFFICES IN PRINCIPAL INDUSTRIAL CITIES

Catawissa PERFECT SEAL Unions

HOT FORGED from solid, rectangular steel bars, designed and produced for dependable, long-life service under the severest piping conditions!

A TYPE FOR EVERY USE!
FOR ALL PRESSURES!
FOR ALL TEMPERATURES!

Standard & Double Extra Heavy UNIONS

Available with screwed or socket weld ends. 3000-lb. sizes ⅛" to 3"; 6000-lb. sizes ⅛" to 2".

ORIFICE UNIONS

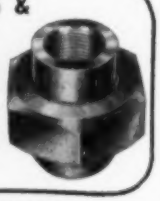
With screwed or socket weld ends. 3000-lb. and 6000-lb. service.

MALE & FEMALE UNIONS

With steel-to-steel, bronze-to-steel, stainless steel-to-steel or orifice seats. 3000-lb. service only.

FULL STAINLESS & FULL ALLOY STEEL UNIONS

With screwed or socket weld ends. 3000-lb. and 8000-lb. service.



WRITE FOR CATALOG 11

showing the complete Catawissa line of Perfect Seal products

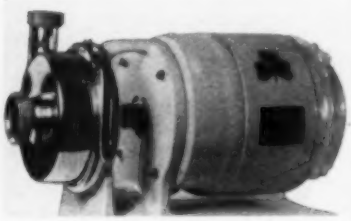
CATAWISSA VALVE & FITTINGS COMPANY
950 MILL ST. • CATAWISSA, PA.

new equipment (continued)

For more data circle item code number on the postage free post card—p. 17

Centrifugal Pump Design

H-12 TRI-CLOVER MACHINE CO., Kenosha, Wisconsin, now offers a complete line of corrosion-resistant sanitary and industrial centrifugal pumps.



Tri-Clover Machine's "Pump King" Unimount series designed for operation at 1800 and 3600 rpm, and especially where high speeds are required, through heaters, coolers, filters, clarifiers, etc.

These pumps have fast, non-clogging centrifugal action with special seals for practically every requirement. They are available in a complete range of sizes and capacities up to 1250 gpm and up to 250 feet of head at zero gpm.

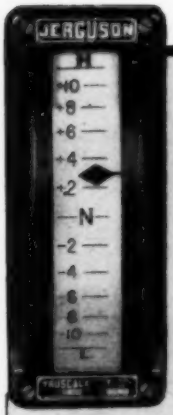
The pumps will handle any liquid that will flow to them and are designed to give efficient transmission and low cost maintenance. They feature patented screw type impellers with sanitary impeller clips, inert carbon seals easily removed for cleaning, streamline lightweight heads with a minimum of parts, and the exclusive Tri-Clamp casing construction which permits fast, easy pump assembly or disassembly.

Heavy Duty Steam Cleaner

H-13 QUICK CHARGE, INC., 1759 N. E. 10th St., Oklahoma City, Okla., has just put on the market a new heavy duty steam cleaner unit that is large enough to operate two steam-guns.

It will deliver 200 gallons of combined saturated steam and cleaning detergent per hour. A force of 130 lb pressure drives this cleaning spray in a blast that quickly cuts off dirt, grease or other objectionable matter. Full steam is generated from cold water in only two minutes.

Extra safe and simple operation of this unit is assured by the fact that 2 electrical switches are the only controls. It is available either as a stationary or portable unit.



Assures Positive Distance Reading of Liquid Levels

JERGUSON TRUSCALE GAGE

THE modern design JERGUSON TRUSCALE GAGE gives new accuracy for reading of liquid levels in boilers, deaerating tanks, etc.

Here is the remote reading gage which incorporates all of the newest engineering features! The Jerguson Truscale has exceptional sensitivity, with ability to register changes as small as ½ of 1% of range! The translucent dial scale is clearly lighted from behind, and is easy to read.

Available with positive alarm system. Lights and horn signal too high or too low water level.

Visible Alarm

Horn

Repeater

Available with Repeaters which repeat accurate level readings at auxiliary locations.

Marine Operators: *Special installation procedure compensates for roll and pitch of your ship.*

Write for Truscale Catalog

JERGUSON

Gages and Valves for the Observation of Liquids and Levels

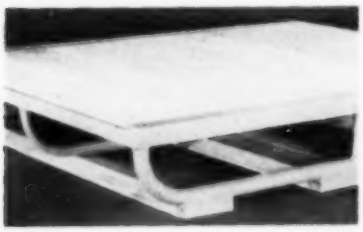
JERGUSON GAGE & VALVE COMPANY
100 Fellsway, Somerville 45, Mass.

Offices in Major Cities

Bailey Meters & Controls, Ltd., London, Eng.
Controle Bailey, Paris, France

Low Maintenance Pallet Design

H-14 ECONOWELD CORPORATION, 515 Callahan Bldg., Dayton 2, Ohio, has introduced a new type of steel and hardwood pallet, assembled entirely without fasteners.



No fasteners in Econoweld's heavy-duty stacking type pallet. Maintenance and replacement costs due to fastener failure are eliminated.

The steel members of the new product consist of three tubular steel skid runners welded to a deck-retaining frame of angle iron which armors the hardwood deck. Deckboards are nested in the retaining frame and are clamped in position by keyboard spring lock. Bottom boards are individually secured by heavy-gauge steel containers welded to the skid runners.

Light-Weight Power Drive

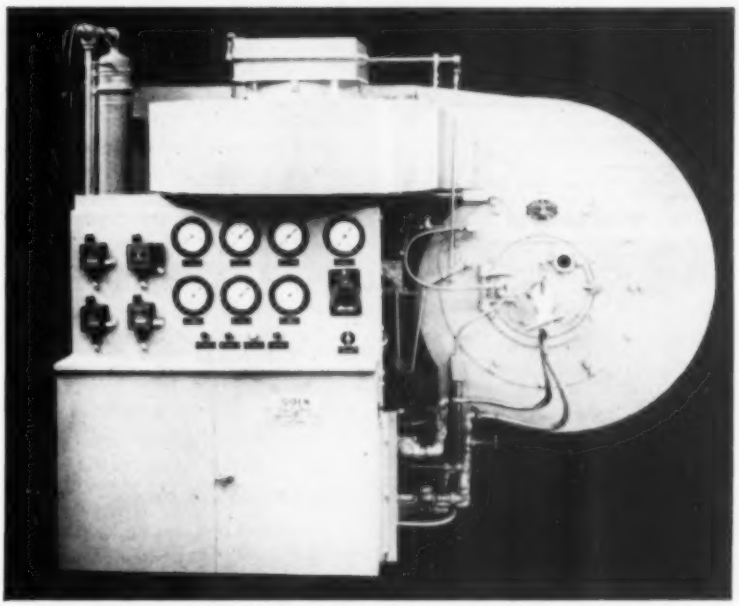
H-15 BEAVER PIPE TOOLS, INC., Dana Ave., Warren, Ohio, has introduced a new all-purpose power drive.

New Beaver unit can be used easily on bench, truck or with pipe legs right on the job location.

By replacing the old cast steel-iron metal housing and chuck with aluminum, total weight has been cut to about 100 pounds. Other design changes include more convenient location of switch; lever safety-lock on switch; and, bronze spindle bearings.

SAFER! SIMPLER! SAVES MORE FUEL!

Coen PAC-O-MATIC OIL & GAS BURNERS



COEN MODEL 675CS4APH PAC-O-MATIC #6 OIL BURNER to develop 25,000 PPH. Completely automatic steam atomizing (automatic compressed air start). COEN EC-5 Precision Throttling Combustion Control for 8-10 to 1 modulating range, plus automatic on-off firing at minimum firing rate. Unit complete with Integral Pump and Heater Set.

Investigate the COEN PAC-O-MATIC!

Gas and/or Oil Burner for your new Package Boiler or Conversion Installation. Note these distinctive features *exclusive* with the COEN PAC-O-MATIC BURNER—

SAFER
- *Special*, Surer Purge Cycle
- *Single Manual* Control Station
- COEN "Fireye" Gas Pilot

SIMPLER
- Complete Integral Units
- *Single* Fuel and Air Control
- Simply mount and pipe and wire to service connections

SAVES MORE FUEL
- 8-10 to 1 Modulating Range
- COEN "Slow-opening" Damper
- Register "louver" control (automatically!)

Send for complete specifications and illustrated Bulletin No. P-152

COEN COMPANY
COMBUSTION ENGINEERS · DESIGNERS · MANUFACTURERS
OIL AND GAS BURNER EQUIPMENT FOR INDUSTRY
MAIN OFFICE AND PLANT: 65 BOARDMAN PLACE, SAN FRANCISCO 3
Eastern Agents and Warehouse — Coen Burner Sales Co., P.O. Box 7, Union City, New Jersey

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42 Cross St., Westfield, Mass.

SOUTHEAST—Stephen May
585 Sherwood Rd., N.E., Atlanta, Ga.

GREAT LAKES—P. P. Schoonhoven
228 No. La Salle, Chicago, Ill.

SO. INDIANA—KY.—Ralph M. Barnes
3550 No. Hawthorne Lane
Indianapolis 44, Indiana

GULF SOUTHWEST—J. Newell Royall
P. O. Box 544, Houston, Texas

MIDWEST—The Walling Co.
1504 Dodge St., Omaha, Neb.

MIDWEST—The Walling Co.
207½ First Ave., West, Newton, Ia.

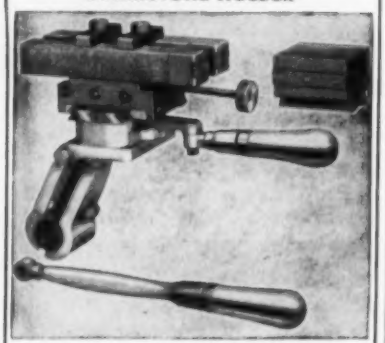
NORTHWEST—Northwest Industrial Service Co.
2457 East Marginal Way, Seattle, Wash.

NORTHWEST—Duane Peabody Co.
2201 N.W. Thurman St., Portland, Ore.

SOUTHWEST—A. H. Merrill Engineering Co.
1238 S. Atlantic Blvd., Los Angeles, Cal.

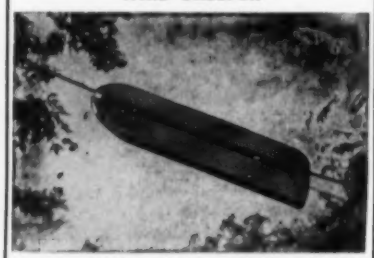
MARTINDALE

COMMSTONE HOLDER



Holds Commstones rigid and true for concentric resurfacing of commutators and slip rings while running at normal speeds in their own bearings. Grinds commutators 4½ to 4¾" wide. Used with two Commstones in stone holder or one Commstone in 2" box.

WIRE CREEPER



A new, speedy method of stringing additional overhead wires over houses, through trees, across congested areas, etc., by means of a remote controlled creeper that carries cord from one pole to next on available wire.

MICA-MILLER

A powerful, light-weight, low cost, easy to use Undercutter, operating from 1/5 h.p. Universal motor. Available with small, medium or heavy duty head (interchangeable). Also available with air motor, or flexible shaft drive.

Write for New 64-page Catalog No. 29 describing these and many other products for Industrial Maintenance, Safety and Production.

MARTINDALE ELECTRIC CO.

1334 Hird Ave. Cleveland 7, Ohio

new equipment (continued)

For more data circle item code number on the postage free post card—p. 17

Truck Battery Charger

H-16 MOTOR GENERATOR CORPORATION, Hobart Brothers Affiliate, Troy, Ohio, has introduced the new Hobart Four-Circuit Monitor Charger.

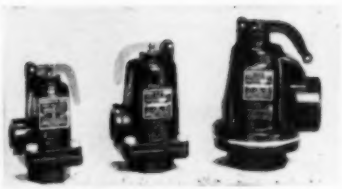
A four-circuit package unit for 6-cell lead-acid or 10-cell nickel-iron motorized hand truck batteries, the monitor charger combines the efficiency and lower maintenance per circuit of multiple-circuit equipment with the compactness, simplicity and flexibility of the single-circuit unit.

Four charge controls, the motor starting switch, and the motor and generator controls are all mounted in the monitor top control cabinet as an integral part of the motor generator set. All components are readily accessible. Standard equipment includes four ten-foot charging cables. No special preparations are necessary for installation—the user need only provide a three phase power supply and a suitable disconnect switch.

Pressure Relief Valves

H-17 MCDONNELL & MILLER, INC., 3500 N. Spaulding Ave., Chicago 18, Ill., have announced two new larger size pressure relief valves, for use on hot water space heating boilers to protect against over pressure.

According to the manufacturer the new valves were developed to make pressure protection available at moderate cost for hot water boilers with heat output to 743,400 Btu/hr and 1,025,100 Btu/hr respectively. The original ¾ in. valve has a capacity of 303,000 Btu/hr. All valves are designed to open at 30 lb pressure.



ORIGINAL 230—¾ Inch | NEW 230—1 Inch | NEW 230—1½ Inch

McDonnell & Miller's original ¾ in. size at the left and the new 1 in. and 1½ in. sizes.

All valves are tamper-proof, with pressure settings established at the factory. Independent-action testing lever cannot interfere with automatic operation of the valve even if tied down. Each valve can be easily disassembled for inspection of servicing by removing four screws.

Paste Solder

H-18 EUTECTIC WELDING ALLOYS CORPORATION, 40-40 172 St., Flushing, New York, N. Y., has introduced a paint-on solder paste combined with flux, trade-named Eutec-TinWeld, and claimed to vastly increase speed of application while cutting waste to a minimum.

The product, which can also be used as a tinning compound in paste form for all tinning operations, is reported to be ideal for production and repair items and for intricate parts where conventional methods are impractical.

Basically, TinWeld consists of a specially formulated lead-tin-solder that is pre-mixed, in paste form, in proper proportions with its specially compounded accompanying flux. The resultant product is said to yield a capillary flow similar to silver solder

industrial equipment company

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YOUR AUTHORIZED RAY DISTRIBUTOR . . .
Oil, Gas & Gas-Oil Combination Burners

with strengths equivalent to conventional lead-tin solders, while completely eliminating the waste and awkwardness involved in melting solder off a stick or coil in the ordinary way.

Whatever small amount of flux residue may result from the TinWeld paste application can be washed off with plain water, thereby preventing corrosion.

Pressure Sensitive Tape for Storage Identification

H-19 LABELON TAPE COMPANY, INC., 450 Atlantic Ave., Rochester 9, N. Y., has introduced a new plastic "write-on-it" tape for labeling shelves, bins and drawers for tools, dies, parts, inventory and raw stock where labels that do not adhere well have presented a problem.

The new tape, known as "Labelon," is of the pressure-sensitive type and sticks without moistening. It can be written on without ink, crayon, or pencil—all that is needed is a sharp point. Pressure of the writing instrument causes the writing to appear beneath a protective outer coat of transparent plastic, which protects the label against smudging, oil, grease, water, most chemicals and dirt. Neither adhesive qualities nor legibility are affected by temperature changes between −40 F and 150 F. The tape will not curl, discolor or lose its adhesiveness because of age.

Labelon, used here to mark lead pipe elbows, sticks without moistening to any smooth, dry and reasonably clean surface. Offers good resistance to smudging and to oil, grease, water and chemicals.

This NEW METHOD DRIES AIR

PRECISELY as you want it

- to control your product's quality
- to prevent condensation on your product or material
- to prevent changes due to moist air in contact with your product
- to protect your material from dampness
- to protect your processing of moisture-sensitive material
- to DRY your material or product
- to pack or store your product safe from moisture damage
- to get exact moisture control for the precise atmosphere condition you need
- to provide precise atmospheric conditions for testing
- to increase your air conditioning capacity
- to DRY large quantities of fresh air from outdoors

The Niagara's Controlled Humidity Method using HYGROL moisture-absorbent liquid is

Best and most effective because . . . it removes moisture as a separate function from cooling or heating and so gives a precise result constantly and always. Niagara machines using liquid contact means of drying air have given over 20 years of service.

Most reliable because . . . the absorbent is continuously reconcentrated automatically. No moisture-sensitive instruments are required to control your conditions.

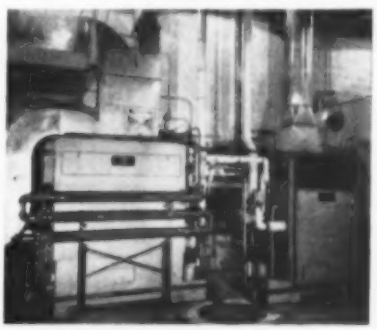
Most flexible because . . . you can obtain any condition at will and hold it as long as you wish in either continuous production, testing or storage.

Easiest to take care of because . . . the apparatus is simple, parts are accessible, controls are trustworthy.

Most compact, taking less space for installation.

Inexpensive to operate because . . . no re-heat is needed to obtain the relative humidity you wish in normal temperature ranges and frequently no refrigeration is used to remove moisture.

The cleanest because . . . no solids, salts or solutions of solids are used and there are no corrosive or reactive substances.



Niagara Controlled Humidity Air Conditioning

This method removes moisture from air by contact with a liquid in a small spray chamber. The liquid spray contact temperature and the absorbent concentration, factors that are easily and positively controlled, determine exactly the amount of moisture remaining in the leaving air. Heating or cooling is done as a separate function.

For complete information write

NIAGARA BLOWER COMPANY

Dept. SP, 405 Lexington Ave., New York 17, N. Y.

District Engineers in Principal Cities of United States and Canada

It's Not Too Late!—Rickenbacker

(*Starts on page 58*)

office were negligible. Government, at all levels, was "little." No one was beholden to government or afraid to speak out and take issue with a local, state or national official.

Now, when governments collect and disburse each year more than 30 per cent of the aggregate of all incomes, and when governments are our chief business organizations, and regulators of private business, all citizens are substantially beholden to and dependent upon the favors of governments at one level or another, and must deal with the officials of governments in seeking to obtain their fair shares of benefits, subsidies and permits.

The Trek Back is Not Easy

As we have observed in the efforts of the new national administration, it is not easy to correct a trend in government that has gained such momentum, but it rests on men and women such as you readers, who have character and intelligence and qualities of leadership, to make your influence felt in the right direction.

As I emphasized before, it is as easy for a nation—as for an individual—to surrender to the placid sweetness of death. It takes courage and strength for a nation to live.

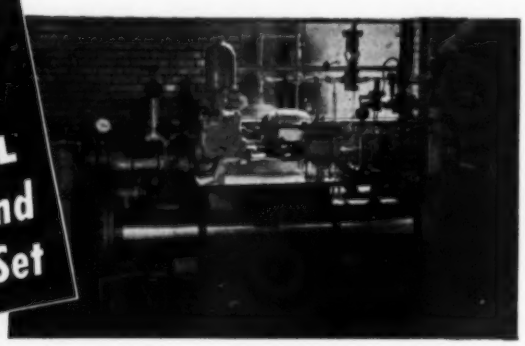
We must fight for our American Way of Life. But dollars and bullets are not enough. If we pin our hopes on these alone, we are doomed to fail. We must have spiritual rearmament as well. On our people has fallen a responsibility, greater than that of any other people; you and I, loyal custodians of our precious heritage, have our part to perform.

Let us acknowledge and be grateful for the blessings of freedom which God has given us.

Let us, therefore, pray every night for the strength and guidance to inspire in others the gratitude, the obligations and the responsibilities that we owe to this great land of ours for the sake of future generations—our boys and girls—our Leaders of Tomorrow. Then, and then only, can we say when the candle of life burns low, "Thank God I have contributed my best to the land that contributed so much to me."

REPRINTS up to five will be furnished without charge. Larger quantities will be supplied at cost, 3¢ each.
W. R. C. SMITH PUBLISHING COMPANY
806 Peachtree St., N.E., Atlanta 5, Ga.

ENCO
DUAL FUEL-OIL Heating and Pumping Set



Two heaters and two pumps—one steam, one electric driven—in one set with these six features:

1. Completely automatic operation with temperature and pressure regulation.
2. All essential equipment—including safety valves as needed—in one compact unit.
3. Individually designed to meet the specific needs of the power plant.
4. All parts visible and accessible for easy operation, maintenance and repair.
5. Pumps run at moderate speed. Heaters designed to give the correct viscosity and velocity without fouling.
6. Cleaner boiler room . . . all overflows connected to a common outlet, flanged drip pan for pumps catches oil drip.

EC490

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75 WEST STREET, NEW YORK 6, N. Y.
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MAKE EVERY THREADED CONNECTION LEAK PROOF with

RECTORSEAL #2

It's the perfect sealant for every threaded or gasketed connection—clean, easy to use, economical. Thin in the can, it thickens in the joint to a plastic elasticity that provides a positive seal. It never hardens—never becomes brittle.

Rectorseal #2 holds natural, manufactured and LP-Gases, natural gasoline, butadiene, synthetic rubber and other petroleum base chemicals; also gasoline, diesel and fuel oil. It is unaffected by refrigerant gases, freon, sulphur dioxide. Will not contaminate water.

Available in ¼, ½ and 1 pt. brush-top cans—qts. and gals. in friction-top cans. Test it—write for ¼ pt. free sample.

Rectorseal, Dept. V
2215 Commerce St., Houston 2, Tex.

RECTORSEAL # 2

Lightning Protection

(*Starts on page* 66)

unable to drain off any of the surge. We checked our grounds two years ago and plan to check them at that interval from now on.

Obtaining a safe ground, which is five ohms or less, is of prime importance to industrial plants as well as power companies. They will insure, in conjunction with your arresters and capacitors, better protection against lightning, failure of insulation, and continuity of service.

This material has been adapted from Mr. Ward's comments at the recent Textile Electrical Conference at Georgia Institute of Technology, sponsored by the American Institute of Electrical Engineers.

Oxy-Acetylene; Maintenance Tool

(*Starts on page* 55)

and rivets in a barking drum is illustrated. Approximately 3,500 ft of 1¼ in. weld and 24 1⅛ in. rivets are used in rebuilding each of these drums. The mechanical shock caused from the tremendous load of wood being turned over in the drum cracks the welds and loosens the rivets. In rebuilding these drums the welds and rivets are removed by the use of hand torches equipped with large size wash and rivet cutting tips.

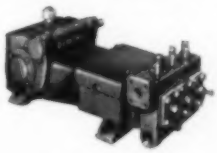
Approximately 12,500 cu ft of oxygen and 6,000 cu ft of acetylene are consumed in rebuilding each of these drums.

The illustrations show a few examples of the numerous time and moneysaving uses found for oxy-acetylene in maintenance work. It is our opinion that the oxy-acetylene torch is one of the greatest timesaving tools ever perfected. Without its availability the continued high standard of our maintenance operations would not be possible.

Don't miss . . .

Equipment, supplies and methods—19 new items for the plant engineer and operating force starting on page 8.

Handled by Deming Pumps



Pumping starch-paste is the job of four Deming Fig. 2993 "Oil-Rite" Horizontal Triplex Pumps in a factory making large paper bags for a wide variety of products. The paste is the adhesive used in sealing the bottoms of the heavy-duty bags.

From three to six months was the maximum life of all pumps used before the Deming "Oil-Rite" Triplex Pumps were installed in April 1951. Up-to-date, all four Deming units have pumped away without a breakdown.

This is one of a multitude of high pressure pumping jobs handled successfully by Deming Fig. 2993 "Oil-Rite" Horizontal Triplex Pumps. Designed for working pressures up to 1000 pounds, these units are built to produce a steady, uniform discharge with practically no vibration.

Ask your Deming Distributor or write us for full details.

THE DEMING CO. • 549 BROADWAY, SALEM, OHIO

DEMING *Industrial* **PUMPS**

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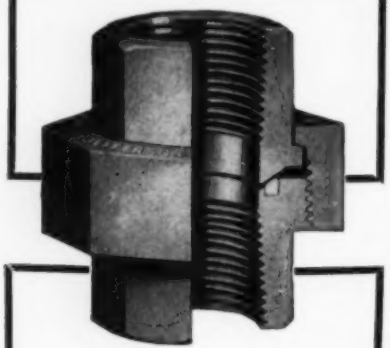
UNIONS
featuring the
exclusive
RECESSED BRASS SEAT



. . . meet all your piping needs

Because the JEFFERSON line is complete in sizes and types, including convenience unions in all-female and male-female types, as well as flange unions, a service is here available to satisfy all your needs.

And remember this: "JEFFERSONS" are of air-refined, air-tested malleable iron, of 55,000 p.s.i. tensile strength. They offer the universally-accepted Recessed Brass Seat, consisting of a brass ring cut from *seamless drawn tubing* and press-fitted into a *machined* retaining channel. Here is a ball joint of truly spherical contour which cannot rock loose and which is recessed so that pipe ends cannot come in contact with it.

Remember, too, that all Jefferson "300 LB" unions are plainly so marked for your identification and protection.

Jefferson offers OWG 2000# to 2" and 1000# up to 4". The line includes AAR male and female unions, Enduro 300#, Excel 250# and Master 150# unions. All types also available with all-iron seats. Underwriters approved.

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Free literature on the latest developments in equipment and supplies is offered by leading manufacturers. For your copy, circle the item number on one of the reader service post cards provided on pages 17 and 18.

T-1 **ELECTRIC MOTORS** — Brochure 100, 12 pages—Covers performance, dimensional data, construction features, product application of Electro Dynamic motors and generators. Charts provided to aid in selection. Discusses electrical and mechanical modifications available for particular installation needs.—GENERAL DYNAMICS CORPORATION, Electro Dynamics Division, Ave. A and North St., Bayonne, N. J.

T-2 **PIPE INSULATION**—Bulletin UFP-353, 6 pages—Illustrates and describes flexible, featherweight, non-breakable, one-piece molded fine glass fiber pipe insulation. Discusses composition; thermal efficiency; physical characteristics; and handling characteristics, in industrial use.—GUSTIN-BACON MANUFACTURING CO., 210 W. Tenth St., Kansas City, Mo.

T-3 **MACHINERY COLORS**—Form No. 125, 6 pages—Illustrates and describes new color group for plant interiors and machinery, specially prepared to assure pleasing colors and harmony in contrasts, as well as to harmonize with existing decorations.—RUST-OLEUM CORPORATION, 2749 Oakton St., Evanston, Ill.

T-4 **STEAM CLEANER**—Bulletin 128, 4 pages—Describes new model for automatic high-volume steam cleaning, including new automatic controls. Illustrations show steps for operation, equipment parts, and application. Specifications are included.—KELITE PRODUCTS, INC., 1250 N. Main St., Los Angeles 12, Calif.

T-5 **STEAM TRAPS**—Catalog No. 500, 16 pages—Discusses stream line flow and gives capacity charts for various types of Patented Universal Velan Steam Traps. Covers design and operation, and plant photographs show applications in specific industries.—VELAN ENGINEERING CO., 1 Exchange Place, Jersey City, N. J.

T-6 **FUEL BURNING SYSTEMS**—Bulletin ID53-162, 16 pages—Describes a complete factory coordinated industrial fuel burning system for oil or gas-oil firing. Discusses operation, efficiency, combustion, components, and gives pertinent engineering data. Illustrated.—YORK-SHIPLEY, INC., York, Pa.

T-7 **PIPE HANGER**—Bulletin 153, 12 pages—Describes Counterpoise Pipe Hanger for high temperature piping systems in steam generating stations, refineries and chemical plants. Graphs to aid in selection, tables of dimensions, erection and field adjustment instructions are given, with illustrations of typical installations.—NATIONAL VALVE & MANUFACTURING COMPANY, 3117 Liberty Ave., Pittsburgh 1, Pa.

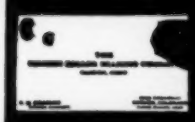
T-8 **INDUSTRIAL HOSE MAINTENANCE**—"Tips on Hose Care," 4 pages—Tells what to do and what not to do in use and storage of various kinds of hose, including steam, fire, oil, gasoline, water, air, suction and sandblast hose. Illustrated.—HEWITT-ROBINS INCORPORATED, 240 Kensington Ave., Buffalo, N. Y.

T-9 **WIRE THREAD INSERTS**—Bulletin No. 652, 22 pages—Discusses uses of wire screw thread inserts in design, production and maintenance, with new specifications and selection data. Photographs, line drawings, text and tables explain use in all materials to provide higher loading strengths and greater resistance to wear, seizing, stripping, galling and corrosion.—HELI-COIL CORPORATION, 1360 Shelter Rock Lane, Danbury, Conn.

T-10 **VARIABLE SPEED MOTORS** — Bulletin No. 1797, 16 pages—Outlines ways variable speed motors can be used to improve production. Illustrates all types of Varidrive motors, mechanical features, remote controls, and related items. Plant photographs show application.—U. S. ELECTRICAL MOTORS INC., Box 2958, Los Angeles 54, Calif.

T-11 **BLOWERS AND EXHAUSTERS**—Bulletin A-932—Describes design and performance features of Hoffman Multistage Centrifugal Blowers and Exhausters for 1 to 9 psi pressures or vacuum from 2 to 12 in. Mercury. Lists industrial applications; includes performance curves and check lists of data required for optimum blower or exhauster specification.—U. S. HOFFMAN MACHINERY CORPORATION, Air Appliance Division, 105 Fourth Ave., New York 3, N. Y.

T-12 **FLOOR RESURFACING** — A.I.A. File 23-D, 4 pages—Describes low-cost Mastic floor resurfacing; explains all necessary proportions for mixing along with ingredients specified for certain jobs. Discusses application as new surfacing over old concrete or wood floors as well as underlayment for leveling floors prior to installation of tile and other coverings.—UNITED LABORATORIES, INC., 16801 Euclid Ave., Cleveland 12, Ohio.



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T-14 **ELECTRODES**—Form ADC 656, 50 pages—Pocket guide lists over 70 different electrodes—stainless, mild and high tensile steels, cast iron, non-ferrous, low hydrogen, and hardfacing, with chemical analysis, procedure for welding, and application. Illustrated.—AIR REDUCTION SALES COMPANY, 60 East 42nd St., New York 17, N. Y.

T-15 **MACHINE TOOL ACCESSORIES**—Bulletin No. 200, 7 pages—Illustrates and describes complete line of Palmgren Products including production vises, angle vises, drill press vises, swivel machine vises, rotary tables, milling attachments, adjustable angle plates, hand vises, and other accessories.—CHICAGO TOOL AND ENGINEERING CO., 8383 South Chicago Ave., Chicago 17, Ill.

T-16 **DUCT INSULATIONS**—A.I.A. File No. 30-A, 16 pages—Contains more than 40 photographs and drawings of the various rigid and flexible Fiberglas insulations for the exterior and interior of warm and cold air ducts, with complete information on the flexible duct liner. Discusses noise reduction and thermal insulating properties.—OWENS-CORNING FIBERGLAS CORPORATION, Nicholas Bldg., Toledo 1, Ohio.

T-17 **SCREW PUMPS**—Bulletin SE-5, 6 pages—Describes new external gear and bearing bracket type screw pumps, for pumping non-lubricating fluids, semi-fluids, fuel oils, crude oils, cellulosics, acetates, distillates, and water. Table of dimensions is included. Illustrated.—SIER-BATH GEAR & PUMP CO., INC., 9252 Hudson Blvd., North Bergen, N. J.

T-18 **CONCRETE FLOOR PATCHING**—Form MQ-3, Chart—Illustrates step-by-step operations in the installation of Masterquick iron-aggregate floor patches for maintenance of concrete industrial floors. Proportions are given for use of mix for shallow holes, for deep holes, and for resurfacing large areas.—THE MASTER BUILDERS COMPANY, 7616 Euclid Ave., Cleveland 3, Ohio.

T-19 **WATER CONDITIONING**—Bulletin 611A, 20 pages—Gives comprehensive data on methods of conditioning water for boiler, process and general use, featuring zeolite water softener of "double-check" design. Includes data on filters, purifiers, degasitors, zeolites, ion-exchange resins, and water treatments for all purposes.—ELGIN SOFTENER CORPORATION, Elgin, Ill.

T-20 **CONTROL CENTERS**—Bulletin MS 6000, 16 pages—Describes Noark Control Centers, lists specifications and enclosure sizes, discusses advantages of centralized control in a plant, shows photographic examples of typical control center installations.—FEDERAL ELECTRIC PRODUCTS COMPANY, 50 Paris St., Newark, N. J.

T-21 **PIPE INSULATION**—Booklet IN6.A5, 8 pages—Describes a gray flexible blanket-type insulation that may be applied in any thickness simply by wrapping on layers until desired thickness is reached. Includes photographs, thickness recommendations, and application data.—OWENS-CORNING FIBERGLAS CORPORATION, Toledo 1, Ohio.

T-22 **HEAT EXCHANGERS**—Bulletin No. FF-FD-9.001, 12 pages—Describes Fin-Fan Heat Exchangers, air cooled units for a wide variety of industrial cooling and condensing applications to replace or augment water-cooled heat exchangers.—THE FLUOR CORPORATION, 2500 S. Atlantic Blvd., Los Angeles 22, Calif.

T-23 **FLOW METER**—Bulletin 401, 18 pages—Describes mercury flow type indicating, recording and totalizing unit, which operates in conjunction with Venturi tubes, flow nozzles and orifice plates, for the measurement of water, gas, air, sewage, sludge or other industrial liquors. Illustrated.—SIMPLEX VALVE AND METER COMPANY, 68th and Upland Sts., Philadelphia 42, Pa.

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Every now and then we find that some people are calling all plastic refractories "Plibrico" . . . just as they often call all cameras "Kodaks", all refrigerators "Frigidaires", and all phonographs "Victrolas".

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There's only one Plibrico in the plastic refractory field. Plibrico is a trade name, not a generic term, and it appears on every carton of our material. Originally, the name Plibrico stood for our jointless firebrick. So completely did this refractory revolutionize furnace lining that a whole group of refractory products grew out of it. Hand in hand came the construction methods, the engineering features, and the service—so that now Plibrico is not only the trade name of a plastitc refractory, but much more.

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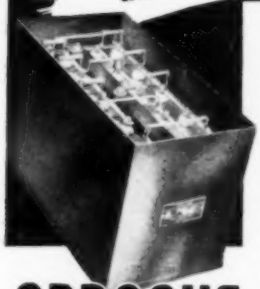

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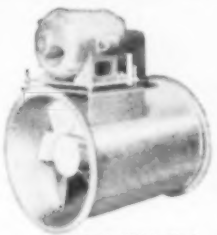
AIR



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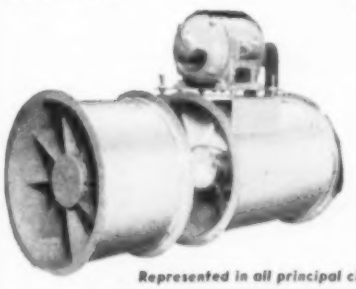

VANEAXIAL FAN

Illustration shows installation of vanes on the discharge side of propeller. Waste energy is converted to useful work. The guide vanes straighten out the air stream, assuring a true axial flow of air.

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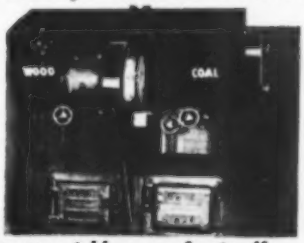

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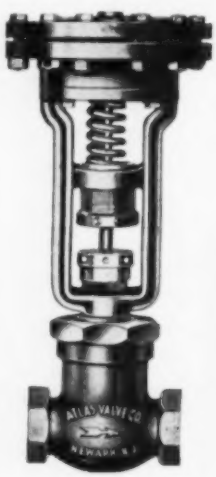

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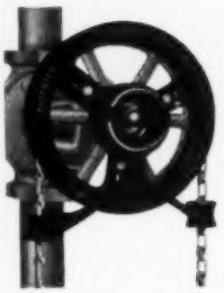

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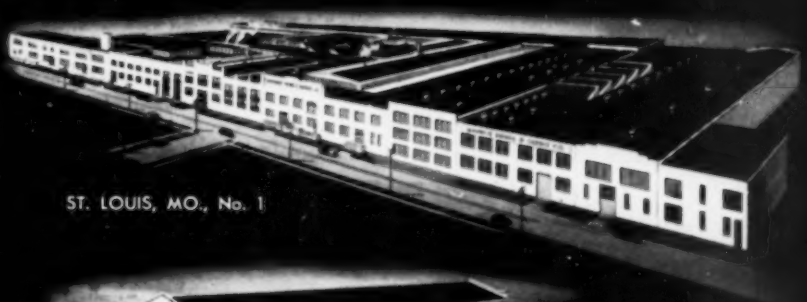

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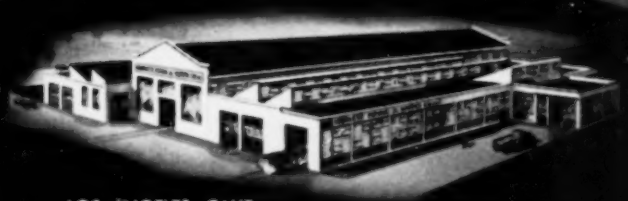

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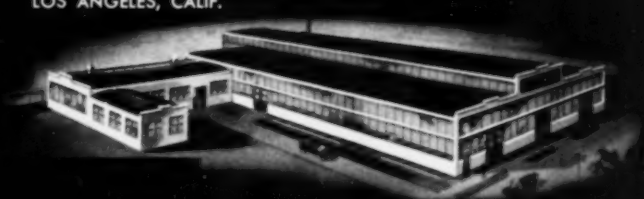

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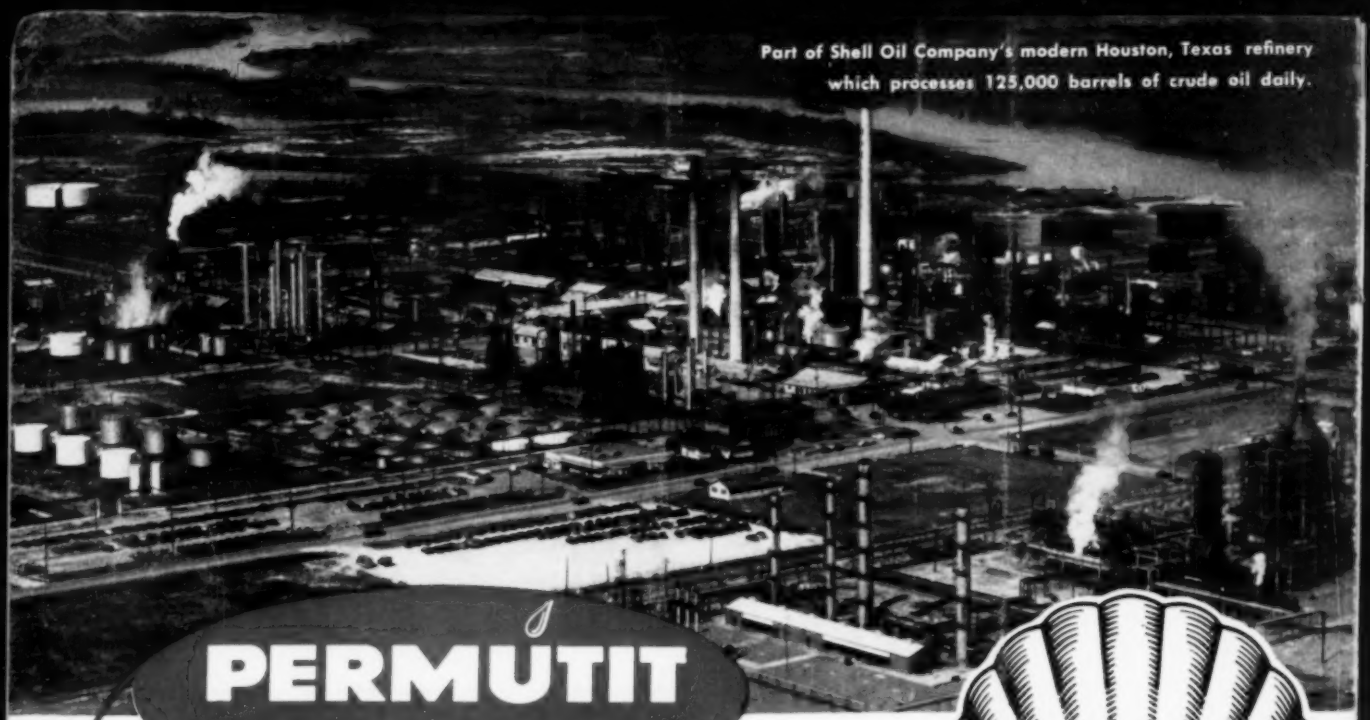

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deliver highest purity makeup for **SHELL**

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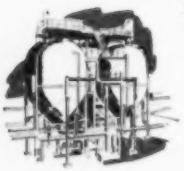
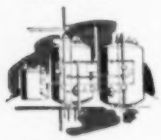
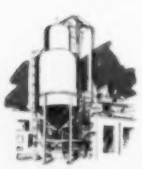


Sludge Blanket Hot Lime Soda



Hot Zeolite-Permutit Q



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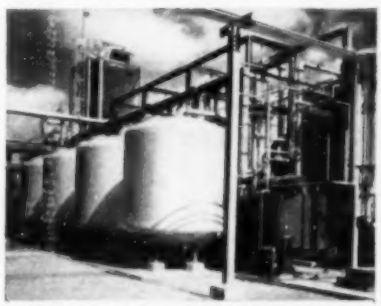
Automatic Permutit Zeo-Karb® units remove metallic cations from Shell's well water supply. Effluent passes to Degasifier at right for low cost CO_2 reduction.



Automatic Permutit S units remove remaining troublesome mineral impurities by anion exchange.

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